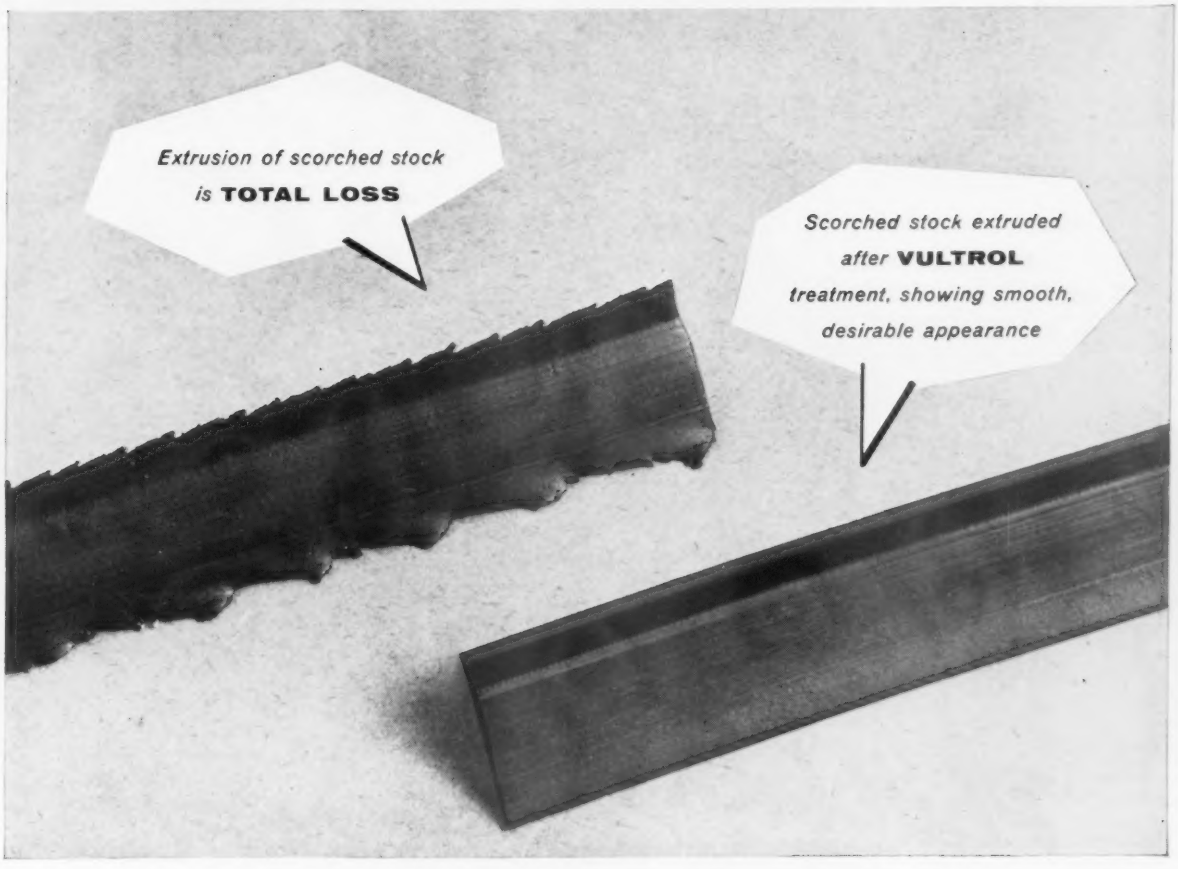
News about

B.F.Goodrich Chemical *raw materials*


Extrusion of scorched stock is TOTAL LOSS
Scorched stock extruded after VULTROL treatment, showing smooth, desirable appearance

Recover scorched stock for extra profits
with Good-rite Vultrol

YOU can convert scorched stock from a loss into profit by using Good-rite Vultrol to treat it. As the samples above show, Vultrol makes possible remarkable recovery. The Vultrol-treated sample extrudes with the same desirable appearance of unscorched stock.

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Good-rite Vultrol is beneficial in the processing of high-loaded or highly accelerated compounds, too. For tire tread compounds it is particularly effective with high-abrasion furnace blacks.

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Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

JULY, 1958 VOL. 83 NO. 4

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Indexed in Industrial Arts Index and Engineering Index

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Highlights Sidelights of the News...

July, 1958

The concensus at the Fourteenth Meeting of the International Rubber Study Group held in Hamburg, Germany, was that natural rubber production in 1958 will exceed world consumption by a small amount . . . Total world requirements of natural and synthetic rubber in 1958 have been set at 3,152,000 long tons including 1,237,000 long tons of synthetic and 1,915,000 long tons of natural (page 674).

Some 55 members attended the Sales Management Clinic held at the annual meeting of the Molded, Extruded, Lathe Cut and Sponge Rubber (Chemically Blown) Products Subdivision of the Mechanical Rubber Goods Division, Rubber Manufacturers Association, held on June 17 in New York City . . . The Clinic covered five specific topics (page 676).

The Office of Defense Mobilization has revised its policy for stockpiling strategic and critical materials, cutting down supplies to a quantity that will meet deficits of three years' duration . . . Since World War II, stockpiling has been maintained on a five-year basis (page 681).

Twelve guides aimed at ending public confusion over the meaning of advertising terms for automobile and truck tires have been issued by the Federal Trade Commission . . . The guides call for tire dealers and tire makers to advertise and label tires so that the buyer will not be misled as to quality and safety (page 682).

DuPont has filed suit in the United States District Court in Wilmington, Del., charging the Phillips Petroleum Co. and its subsidiary, Phillips Chemical Co., with infringement on a DuPont patent on linear polyethylene (page 683).

An international standard for the determination of hardness of vulcanized and synthetic rubber has been approved as a draft recommendation by representatives of the International Organization for Standardization (page 675).

A pattern-setting agreement for a 3.1 per cent boost in wages has been reached by the United Rubber Workers and Goodyear and Goodrich . . . The agreement was reached prior to a midnight deadline July 1 (page 679).

- *a highly reinforcing white pigment*
- *excellent resistance to scorch*
- *good dispersing characteristics*
- *non-toxic*

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pH	9.5-10.5
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Specific Gravity	2.10
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Free Moisture (Maximum)	5%
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Oil Absorption (cc/100g)	130-140

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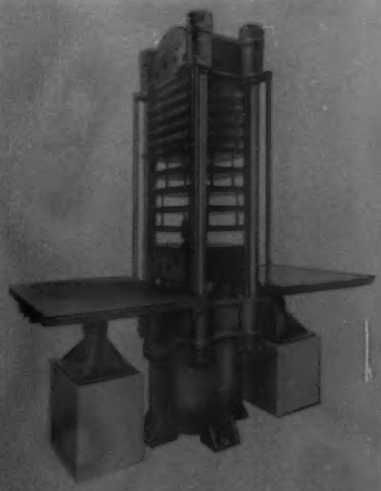

R. D. Wood multiple opening, single ram, four-column type hydraulic platen press for laminating or processing rubber, plastic and composition sheets. Capacity—1200 tons; working pressure—1600 psi; 11 platens, 44" x 50" x 3¼". For complete information, write the R. D. Wood Company, Public Ledger Building, Philadelphia 5, Pa.

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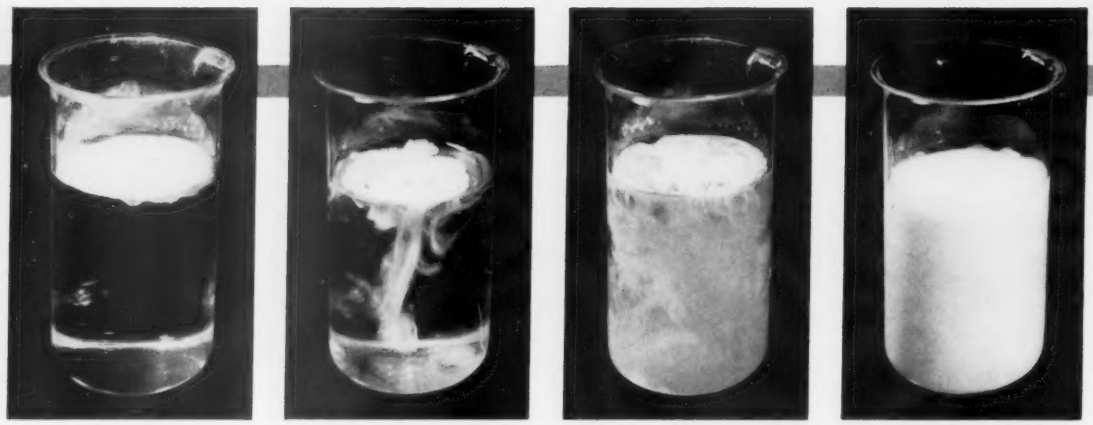

START

5 grams of Protox-169 zinc oxide were added to 300 cc of distilled water.

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*U. S. Patents 2,303,329 and 2,303,330

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Photo courtesy Ebonite Company, Newton 64, Massachusetts

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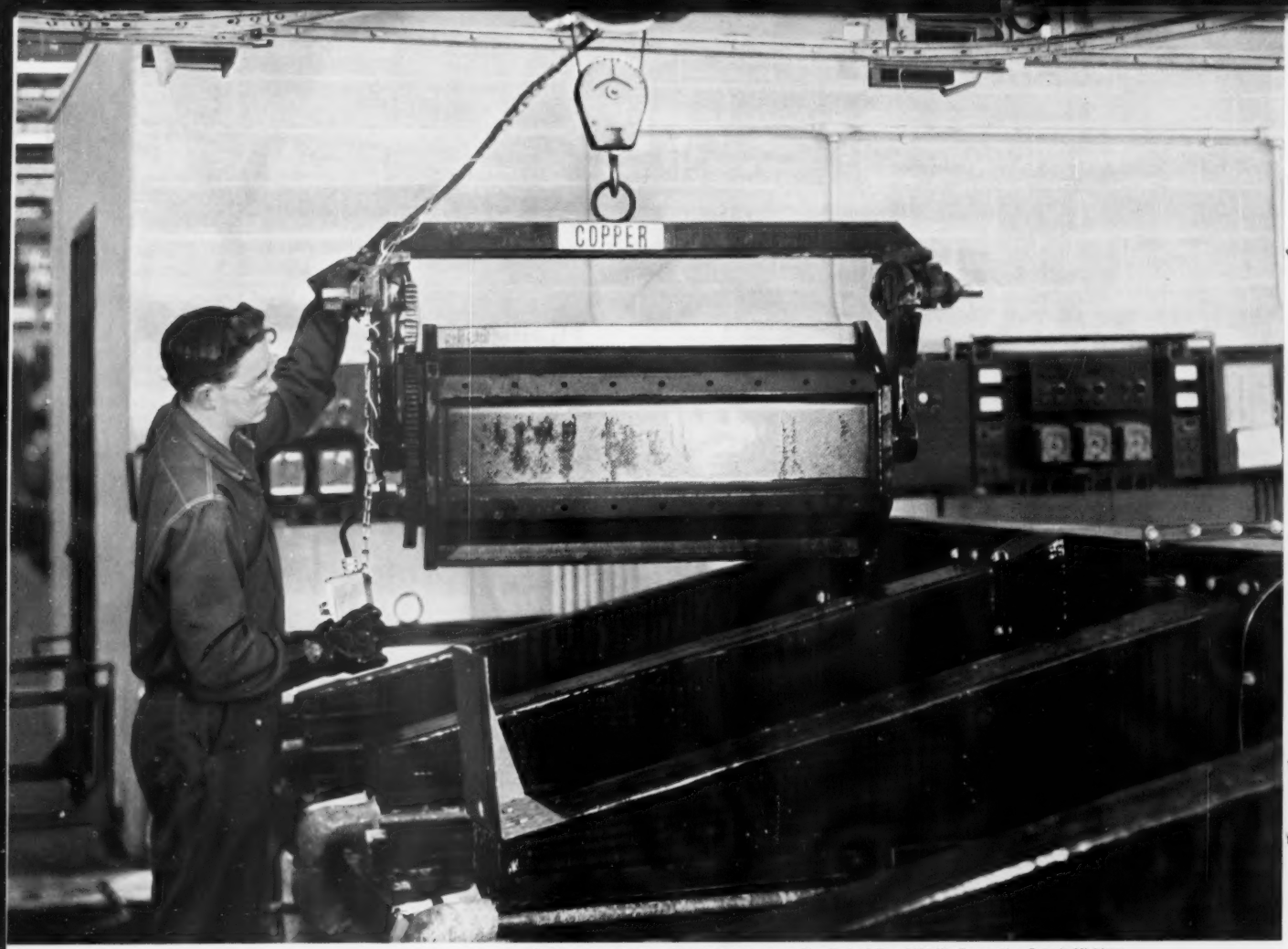

Photo courtesy American Hard Rubber Company, New York, N. Y. and Udylite Corporation, Detroit, Michigan

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Hot problem for a leading supplier of electroplating barrels was finding the right material for the cylinders. In the face of repeated exposure to heat, hard wear and corrosive plating solutions, these cylinders had to keep rolling without contaminating the baths. After many tries, they found the answer—a new, clean-running hard rubber with three times longer life.

The major advance of this new material over its predecessors springs from the fact that it's made with CHEMIGUM nitrile rubber. Its manufacturer uses CHEMIGUM for a combination of strength plus resistance to high temperatures, chemicals and solvents never before achieved in hard rubber.

Besides better barrels for plating, CHEMIGUM as hard rubber has wide applications as pipe fittings and other equipment for handling chemicals at high temperatures. In other forms, CHEMIGUM finds use in many other products requiring unusual resistance to oils, solvents and chemicals over a wide range of temperatures.

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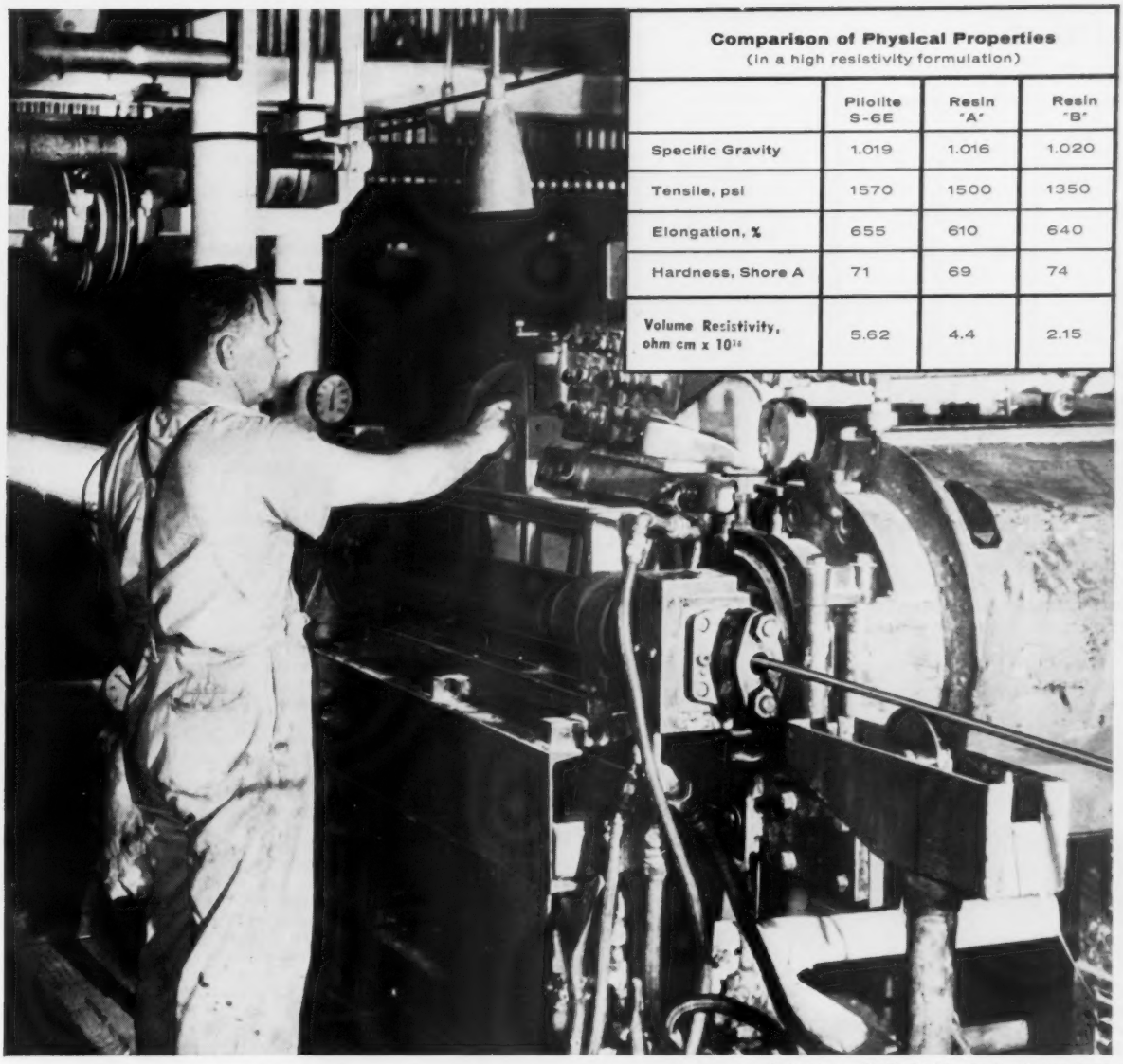

Comparison of Physical Properties
(in a high resistivity formulation)

	Pliolite S-6E	Resin "A"	Resin "B"
Specific Gravity	1.019	1.016	1.020
Tensile, psi	1570	1500	1350
Elongation, %	655	610	640
Hardness, Shore A	71	69	74
Volume Resistivity, ohm cm x 10^{15}	5.62	4.4	2.15

Photo courtesy, The Okonite Company, Passaic, New Jersey

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It's here! PLIOLITE S-6E—the new electrical grade, rubber reinforcing resin that will enable you to meet tight wire covering specifications with ease. In trial plant runs, for instance, PLIOLITE S-6E has been particularly successful in meeting the requirements for covering on HW and RW Wire.

PLIOLITE S-6E is a new high styrene/butadiene copolymer which not only exhibits superior electrical properties (see data above), but also processes and reinforces on a par with any resin on today's market. And best of all, it's offered at the same price as ordinary reinforcing resins.

We think you'll be pleasantly surprised at just how well PLIOLITE S-6E performs. But the best way to find out is to put it through its paces yourself. Samples and full details, including the latest *Tech Book Bulletins*, are yours by writing Goodyear, Chemical Division, Dept. S-9419, Akron 16, Ohio.

GOODYEAR

60 GOODYEAR ANNIVERSARY

CHEMICAL DIVISION

Pliolite—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

Letters to the editor

Re May Editorial

Dear Sir:

I have just received a copy of the May issue of RUBBER AGE, and have read with interest your editorial on pages 314-315, in which you comment on my recent talk to the Commercial Chemical Development Association of New York.

You state that I suggested that Western Europe may show a synthetic preference ratio of 71% by 1960, and that you think this is unlikely. I would certainly agree with your view, as I only said that synthetic rubber consumption in Western Europe might be between 42.5 and 71.1%. I suggested that it would seem desirable to encourage Western Europe to increase its consumption of synthetic rubber by 1960 to a figure nearer the 63.3% estimated for U.S.A. last year. I would also agree that synthetic consumption is likely to be somewhere between 50 and 55% by 1960.

I am sorry if I had not made myself quite clear, but fuller details will be available in our June issue, which contains a complete copy of my talk. I should like to take this opportunity of thanking you for your comments and kind interest.

ALAN PICKETT
Editor
Rubber & Plastics Age
Tenterden, England

Thank You

Dear Sir:

I think that the June issue of RUBBER AGE is one of the best issues you have given us. The technical articles, especially the one on "Effects of Gamma Radiation on Miscellaneous Elastomers and Rubberlike Plastics Materials", are all good and worth studying.

HARRY L. FISHER
Los Angeles,
Calif.

"Must you yell 'off with their heads' everytime the guillotine knife drops?"

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Shop Talk.....

► A two-page advertisement in this issue announces the publication of ADHESIVES AGE, a new journal devoted to adhesives. The decision to publish this new journal was reached as the result of watching the rapidly growing field of adhesives for almost ten years and, more directly, as the result of several studies and surveys we have had made in the past several months.

As indicated by its title, the new journal will completely cover the field of adhesives. It will provide accurate news and information about all types and kinds of adhesives from manufacture through application, including technology, research, marketing and sales.

Our readers will quickly recognize that we are entering a field which is not entirely new or foreign to us. In the more than 40 years that RUBBER AGE has been published, we have had more than passing contact with the adhesives field, whether the adhesives were referred to as cements, bonding agents, or what-have-you.

Although our appreciation of the over-all problems of the field of adhesives is reasonably good, we are taking several steps to make it better. For example, we are forming an Editorial Advisory Board which will be comprised of authorities in the many different phases of adhesives—rubber, resins, starch, glue, etc. Also, one of the surveys we are having made will spell out the needs and requirements of the field.

The editor of the new ADHESIVES AGE will be Arch Doria. Mr. Doria has had many years of experience in the publishing field and also has been closely associated with several of our major industries. He has a good sense of layout and format, and the new journal is expected to take its place quickly among the better business papers available to industry.

The first issue of ADHESIVES AGE will make its appearance in October of this year. Initial distribution will amount to 10,000 copies each issue. Coverage will include every manufacturer of adhesives in the United States as well as the major consumers of adhesives in some twenty-five different industries.

We have already made provision for editorial material in the first several issues of the new journal. However, we are very much interested in hearing from readers of RUBBER AGE who have a direct or indirect interest in the field of adhesives. We are wide open for suggestions on technical and semi-technical material which will prove of pertinent interest to both manufacturers and users of adhesives. Rubbers and plastics will receive full attention in the new journal.

The addition of a new paper to our "stable" does not mean for one moment that we will pay any less attention to the rubber field. Both RUBBER AGE and the RUBBER RED BOOK will continue to receive maximum attention, and our services are yours to command as in the past.

Incidentally, if you call us these days you will notice that the operator responds with "Palmerton Publishing Co.", rather than RUBBER AGE. It's the same old stand, however, and just ask for what you want.

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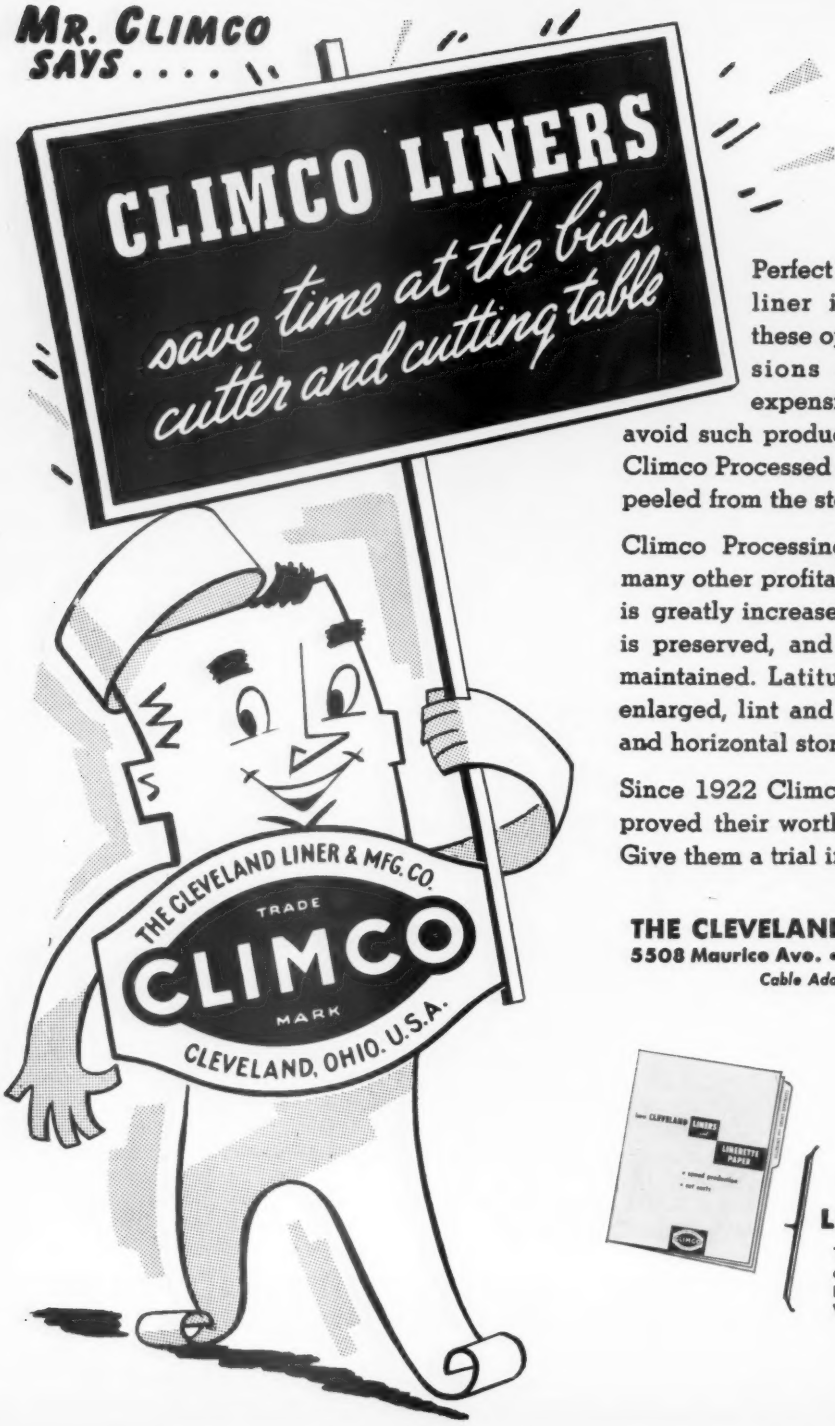
77 Franklin Street, Boston 10, Massachusetts

MR. CLIMCO SAYS....



Perfect separation of stock and liner is all important during these operations—for stock adhesions at either point cause expensive down time. You can avoid such production headaches by using Climco Processed Liners that can be readily peeled from the stock without sticking.

Climco Processing of your liners assures many other profitable advantages: Liner life is greatly increased, tackiness of the stock is preserved, and gauges are more easily maintained. Latitude in compounding is enlarged, lint and ravelings are eliminated and horizontal storage is facilitated.

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RUBBER ANTIOZONANTS

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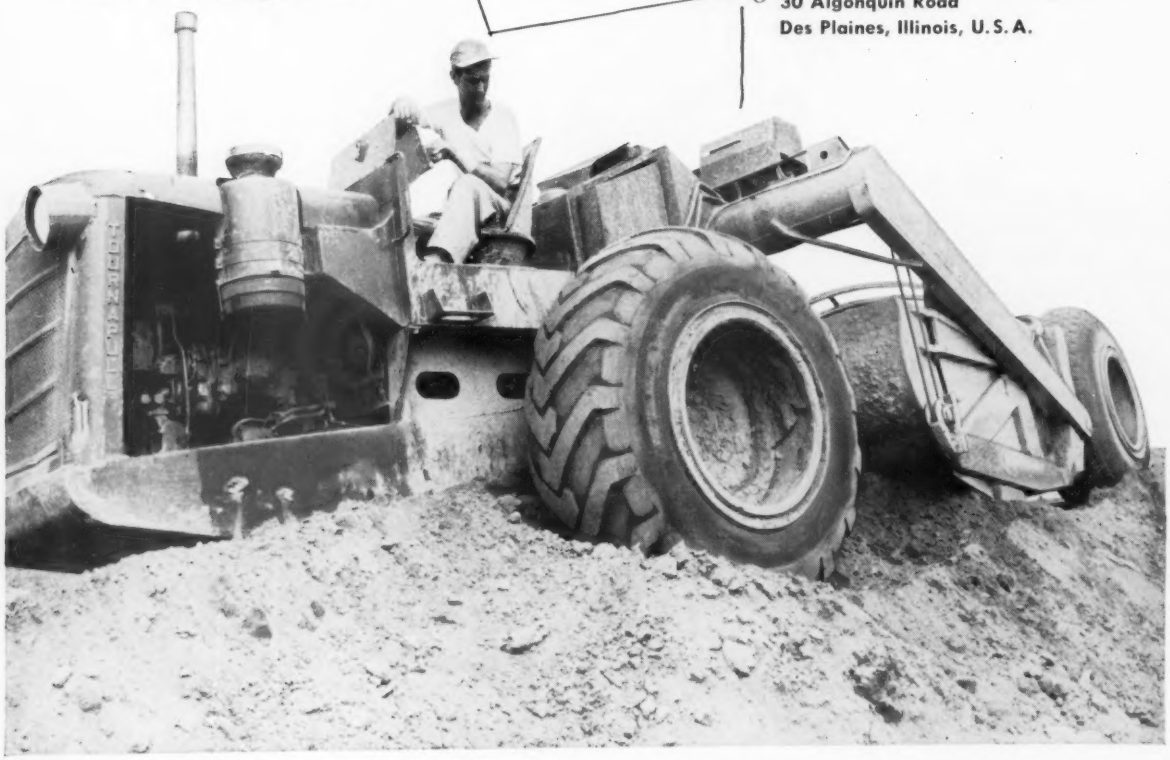

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The Shell Chemical plant at Torrance, California, is your source of a full line of butadiene-styrene synthetic rubber . . . hot, cold, oil-extended and black masterbatch, as well as hot and cold latices.

To help you use these synthetic rubber products to best advantage, the Shell Technical Service Laboratory offers expert assistance. Write, phone or drop in and see us for a catalog and information on specific types of synthetic rubber. Our number in Los Angeles is FAculty 1-2340.

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Synthetic Rubber Sales Division
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SHELL

Capitol Cues

THE RECESSION MAY NOW HAVE REACHED BOTTOM. That's what the latest of available business statistics imply. And this isn't only the official White House line, designed to boost confidence. A majority of economists are swinging around to this view. To be sure, some series still have a way to go before they are done readjusting. But many important ones are near or at their turning points. It won't be long before general recovery begins.

The plus signs that have recently appeared include:
- A leveling in new orders being booked by manufacturing firms.
- A pick-up in home-building, aided by easier terms and credit.
- Stabilizing factory output, as inventory liquidation abates; steel keeps climbing steadily, except for vacation shutdowns.
- Rising freight carloadings of coal, ores, and manufactures.
- Firmness in purchasing power, which has held up remarkably.

This last item may be the most significant plus sign of all.

THE PHENOMENAL STABILITY OF CONSUMER INCOME—in the face of steep dips in output and jobs—is the fact most responsible for the new size-up of business prospects. These days, the consumer is the key to the outlook. With rising government spending only offsetting shrinking plant investment, he is the one who can tip the balance toward either recovery or more slide. With incomes down less than 2%, sales have stayed high, too—off only 1%. So don't blame consumers for the slide. They're not on a buyer's strike.

Folks have shifted buying patterns over the past year.
- Soft goods are up 3% over last year—mainly food and drugs.
- Services are up 5%...a continuation of a long-term trend.
- Durables have caused all the trouble—down by about 10%.

This is where the cuts in jobs and production have centered.

In the absence of broad tax cuts, income isn't going to spurt. It will probably level out by Fall. But if income—and thus spending—just continues at current levels, businessmen will have to step up their buying to rebuild inventory. That will lead to a slowly rising level of factory production and jobs.

THE RECOVERY THAT'S COMING WILL BE A SLOW ONE—fairly long-drawn out. Even the most optimistic of the President's advisers will grant this point. As noted, consumer outlays will rise only slowly—on slowly rising income. U.S. government outlays will also expand just moderately for several months; it takes more than a year to turn orders for hardware into actual spending. And business expenditures for new plant will keep declining well into 1959.

To obtain a more detailed picture of what may lie ahead, we queried a dozen leading economists--half from industry, half from the government. Their projections were very consistent.

Here's the outlook as the experts see it:
- This Summer may see the beginnings of upward movement, partly masked by vacations. Total output may rise ½% to 1% over-all.
- This Fall, the rise will be more apparent, up another 1%.
- Next Winter will see recovery extended with a rise of 1½%.

The experts look for further slow, steady gains during 1959. Not until Spring '59 will activity get up to pre-slump levels.

(Continued on Next Page)

A FAST UPTURN IN BUSINESS IS BEING FORECAST by a few analysts who are betting on a combination of favorable developments to touch off a new boom. This is definitely a minority view, but an interesting one, though the odds against its proving out seem enormous. The economists think business could start to zoom in late Summer, reaching pre-recession peak by year-end.

What combination of factors must be assumed for an upsurge?

- Government spending must start spurting almost immediately, reflecting quick delivery on very recent orders for missiles.
- Home-buying must zoom to the 1.4 million record rate of 1954, instead of the 1.1 million foreseen by even the more hopeful.
- Consumer outlays must skyrocket as folks suddenly fall in love with the cars and appliances that have been leaving them cold.
- Inventory building on a large scale must be begun in a hurry by businessmen, though latest figures show new liquidation.

All these things could happen—but this just isn't likely.

CONSTRUCTION WILL PROVIDE A STRONG PROP for business during the rest of 1958. In dollar volume, work put in place may not reach the industry's optimistic hopes. But it seems likely to total $48 billion—2% to 3% over last year; that would make it one of the few lines that is running ahead. Easier credit and home-buying terms, plus the expanding highway program, will keep building high. Office and commercial building exceed expectations.

SUBSTANTIAL CUTS IN DIVIDENDS ARE NOW CERTAIN to be made this year. In dollar volume, the disbursements so far in 1958 have held up quite well. Relative to profits, though, these same dividends now account for some 80% of sharply reduced net income, as against only 60% of earnings a year ago.

Need for cash would normally have forced cuts in dividends by this time; but many corporations have been hoping for an early improvement and have wanted to keep payments up. But once the slowness of recovery is apparent, industry will have to cut.

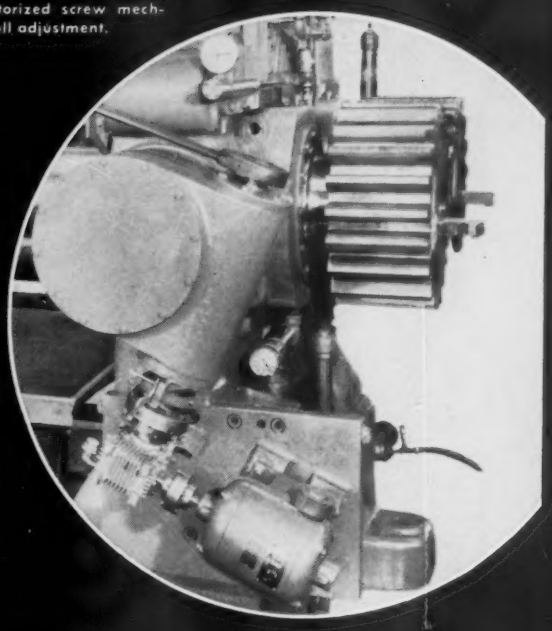
THERE WON'T BE A BALANCED U.S. BUDGET until fiscal 1961—if then. That's the conclusion the experts reach after projecting trends now clear. The recession is cutting tax receipts deeply—not so much personal income collections, as revenue from corporations. (Every $2 drop in profits means a $1 drop in revenue.) Anti-recession spending is upsetting balance, too. This includes extended jobless benefits, mortgage buying, and public works.

So some substantial deficits lie ahead. For fiscal 1959, the red ink may well total $8-$10 billion. For 1960, the deficit will be $3-$4 billion smaller, as business improves. By 1961, spending will taper and receipts will rise enough for balance.

EISENHOWER MAY PLAY A BIG ROLE IN THE COMING CAMPAIGN for Congress. He's angry at the way his program has been mauled, stalled, or shoved aside. He is especially riled at Democrats for what he considers "playing politics" with the recession—trying to put over spending schemes as emergency bills.

Specifically, what Ike may do is stump against the Democrats, blaming them for delay on key bills and for risking inflation. And he will go all out to back up his Republican supporters.

24" x 60" Phenolic Mill with individual bull gear drive for each roll, using one constant speed motor and one variable speed motor for main drive.



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build and install
the right mill
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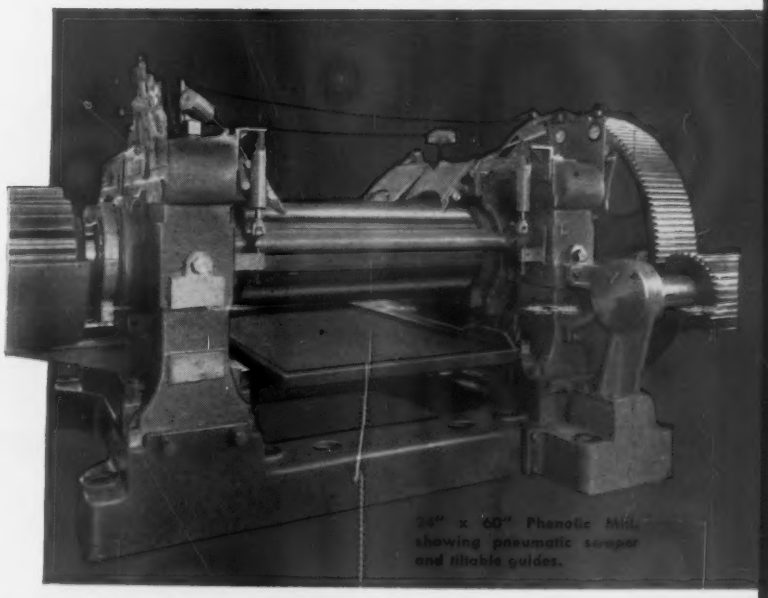
Why not call us in on your next mill installation? There'll be no obligation on your part.



24" x 60" Phenolic Mill, showing pneumatic scraper and tiltable guides.

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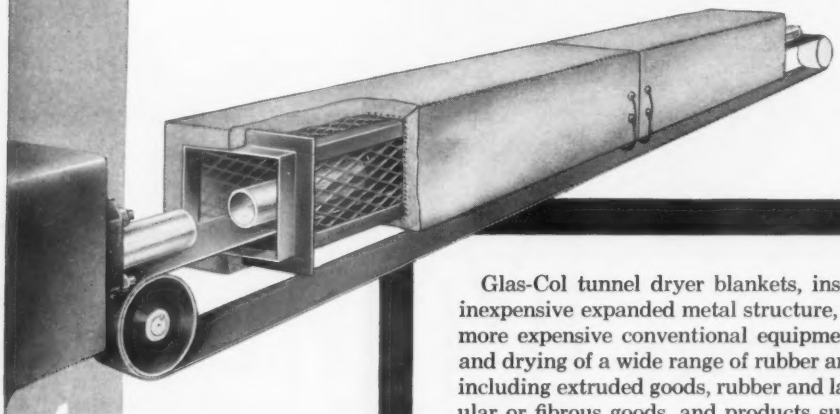
electric tunnel dryer blankets



Glas-Col tunnel dryer blankets, installed around an inexpensive expanded metal structure, can do the job of more expensive conventional equipment for the curing and drying of a wide range of rubber and vinyl products including extruded goods, rubber and latex thread, granular or fibrous goods, and products such as mattresses, pillows, and upholstery.

Glas-Col tunnel dryer blankets are well suited for curing and drying applications requiring temperatures up to 1000° F.

And, the cost of a tunnel dryer blanket installation is but a bare fraction of that of conventional equipment . . . heating costs are reduced, too!

Construction and Design: Glas-Col electric tunnel dryer blankets can be engineered for belts of any width or length. For flexibility of manufacture, shipping, installation and maintenance, the blankets are built in multiple units . . . each ranging from four to eight feet in length.

Heating elements, constructed of high-quality resistance wire embedded in layers of glass fabric, are positioned so that the same temperature is maintained from left to right and front to back of the tunnel dryer.

For additional information, contact Glas-Col Apparatus Company, Dept. RA, 711 Hulman Street, Terre Haute, Ind.

GLAS-COL

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ELECTRIC TUNNEL DRYER BLANKETS

U. S. Patents
2,282,078
2,739,220

U. S. Patents
2,231,506
2,739,221

Specialists in production, pilot plant and laboratory heating problems

. . . and here's a good tip for you . . . ASRC has a reputation for efficient service, too!

ASRC offers you highest quality synthetic rubber . . . efficient service that is timed to your needs . . . personal attention to your orders . . . prompt shipments. You will find it pays to rely on ASRC for *quality* products and *quality* service.

CURRENT POLYMERS

COLD	CLASS	HOT	CLASS
ASRC 1500	Staining	ASRC 1000	Staining
ASRC 1502	Non-Staining	ASRC 1001	Slightly Staining
ASRC 1503	Non-Staining	ASRC 1004	Staining
ASRC 3110	Non-Staining	ASRC 1006	Non-Staining
COLD OIL		ASRC 1009	Non-Staining
ASRC 1703	Non-Staining	ASRC 1018	Non-Staining
ASRC 1708	Non-Staining	ASRC 1019	Non-Staining

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PATENT REVIEW

by Melvin Nord

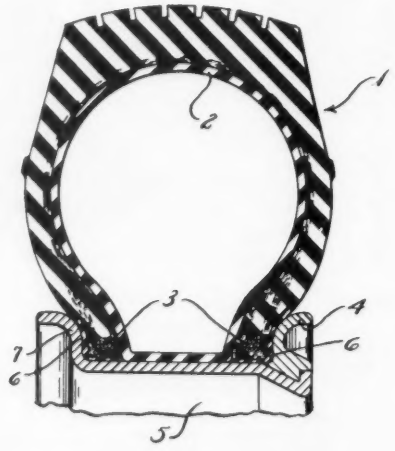
Treatment of Waste Latex Foam

U.S. PATENT 2,814,075, issued November 26, 1957 to Paul J. Dasher, assigned to Dasher Rubber & Chemical Co., relates to the treatment of waste or scrap foamed latex for the purpose of converting it to useful products.

The wet scrap latex foam or sponge is reduced to the form of finely divided powder (40 to 200 mesh) by treating it, under certain conditions, in a Banbury machine. The particles are dry and do not stick to each other, so that the powder is readily pourable. The latex is subjected in the Banbury machine to an intense shearing action while held under mechanical compression sufficient to develop an energy input of at least 0.7 horsepower per pound of material being treated, over a period of 2 to 10 minutes. The maximum temperature to which the mass is permitted to rise is generally 280 to 300°F.

Method of Building Tires

U.S. PATENT 2,822,026, issued February 4, 1958 to James McDermott Willis, assigned to Firestone Tire & Rubber Co., describes an improved method of forming portions of a pneumatic tire such as the bead and chafer portions.



In the illustration above a truck tire indicated at 1 containing a pneumatic tube (2) is mounted on a rim (5) associated with a locking ring (4). Each tire bead (3) is of metal wire construction held to the tire by the fabric plies and protected from rubbing a rim flange (7) and locking ring (4) by chafers (6). Abrasion occurs during rotation of the wheel where slight play

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...a lighter, brighter shade than TAN 15. All three MAPICO tans—10, 15 and 20—offer the same desirable and heat-stable characteristics.

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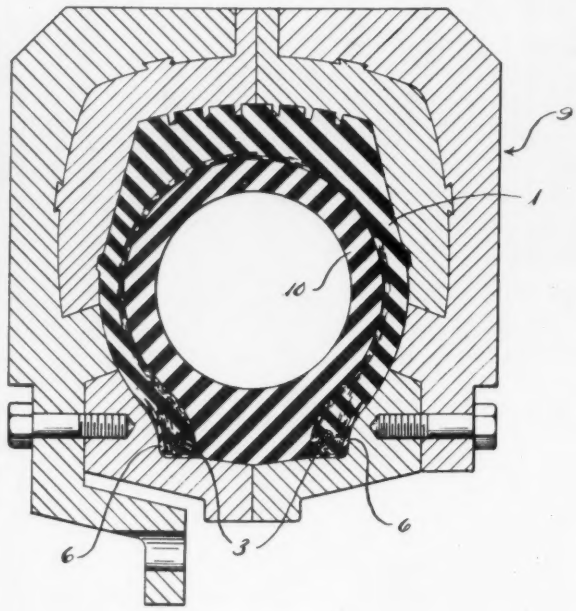
For full information and technical assistance on your application, write...today!

Columbian Carbon Company
MAPICO COLOR UNIT
380 Madison Avenue, New York 17, N. Y.

PATENT REVIEW

and wobble between the tire bead and the rim (5) causes the hard metal flange (7) and the locking ring (4) to rub against the respective beads of the tire.

The figure below shows a tire-curing mold (9) of the steam-heated type containing a tire (1) which encloses a water bag (10). During vulcanization of the



tire, pressures on the order of 175 pounds per square inch are exerted outwardly against the inner walls of the water bag. These pressures combined with the heat of vulcanization which reaches temperatures as high as 325°F. would normally soften the rubber and force it away from the bead portion to expose the chafer fabric. This flow of the rubber occurs because the shoulder of the mold (9) adjacent the chafer (6) of the bead abuts into the surface contour of the tire with the result that when heat and pressure are applied within the water bag, the chafer rubber normally is forced away from the chafer fabric at the bead portion adjacent to the mold shoulder. Tires prior to this invention when removed from the mold after the vulcanizing operation had a bead shape so that the chafer fabric was only lightly covered with rubber. By using the chafer (6) which is resistant to flow during the cure, the chafer fabric is not laid bare during vulcanization and the desired rubber protective cover remains on the fabric.

The present invention provides a rubber compound which, after preliminary heating at a temperature below the normal vulcanizing temperature of a tire, has deformation characteristics resisting pressures and temperatures exerted during tire vulcanization. To obtain this end a rubber hydrocarbon material is mixed with a ther-

Goodrich-Gulf Chemicals, Inc.

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Ameripol 1006 crumb—23% bound styrene copolymer with a non-staining antioxidant.

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Processing cost savings are considerable with Ameripol hot polymers in "crumb" form. You no longer need expensive milling and cutting or pelletizing equipment in solution processes. Ameripol "crumb" form rubber can be dissolved in a churn or a simple agitated vessel.

This innovation in SBR rubber was developed by Goodrich-Gulf research for manufacturers of rubber adhesives, mastics, cements or other products where rubber raw material must be put in solution before processing. It cuts costs in molding and extrusion, too. Manual cutting of conventional bales of rubber to exact weight can be eliminated.

Ameripol hot polymers in crumb form have been fully evaluated in use and are available in production quantities. More than ever, Ameripol is the preferred man-made rubber. Contact us for your requirements.

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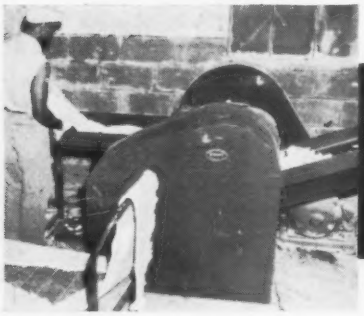
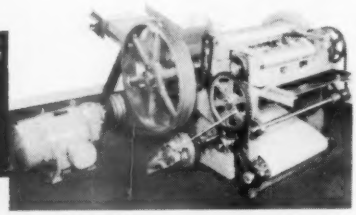


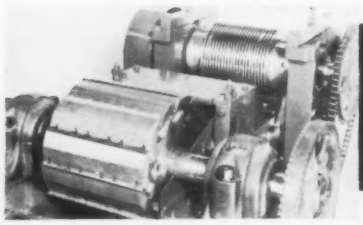
FOR MAKING ADHESIVES

Taylor-Stiles machines cut slabs of natural and synthetic rubber into strips for dissolving in solvents. "Has increased production 25%, improved quality, and made a significant saving of solvents" says important user. (Write for Folder 202.)

FOR CUTTING RUBBER or PLASTIC BLANKS



This machine cuts 5" x 5" rubber blanks from sheets. The sheets are cut into strips 5" wide which are cross cut into 5" lengths. One manufacturer gets 4648 blanks a minute cutting 6' x 2' sheets. (Write for Folder App. 213.)



FOR DICING PLASTIC STOCK

This high-speed, high-production machine cuts thin stock into short lengths. Produces up to 10 tons of pellets an hour. Widely used for clean-cut, uniformly-sized pellets without fines or longs. Other models for cutting thicker stocks and longer lengths.

Also laboratory and small production models.

For full description write for Folders 200, 213 and 216.

TAYLOR, STILES & COMPANY

216 BRIDGE STREET RIEGELSVILLE, NEW JERSEY

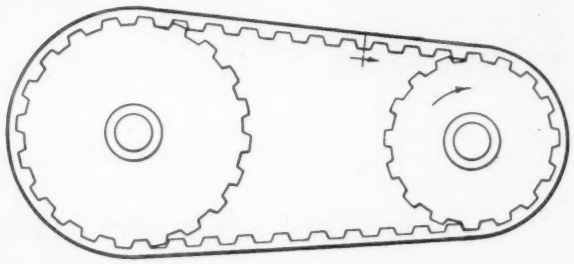
PATENT REVIEW

mosetting resin material to provide a compound which when subjected to a temperature of approximately 212°F. attains a state substantially resistant to deformation.

This state is attained usually at no sacrifice of building tack for the reason that with a treatment for short periods at a temperature of 212°F. the rubbery hydrocarbon component has not vulcanized sufficiently to destroy its tack or its ability to cure onto the sidewall of the tire even though the plastic material has stiffened to prevent subsequent deformation of the compound. It has been found that a mixture of a phenol-aldehyde resin with rubber, containing curing ingredients for the resin as well as curing ingredients for the rubber, attains the desired properties.

Positive Drive Belt

U.S. PATENT 2,815,671, issued December 10, 1957 to William B. Talipsky and Hugh D. Terhune, assigned to United States Rubber Co., relates to silent and light duty positive drives. The belt is an improvement upon other positive drive belts in this field in respect to its flexibility and its ability to withstand shock loads imposed upon the rubber teeth, which are bonded to and cushioned by a softer cushioning layer of rubber interposed between the harder wear-resistant teeth and the flexible load-carrying band.



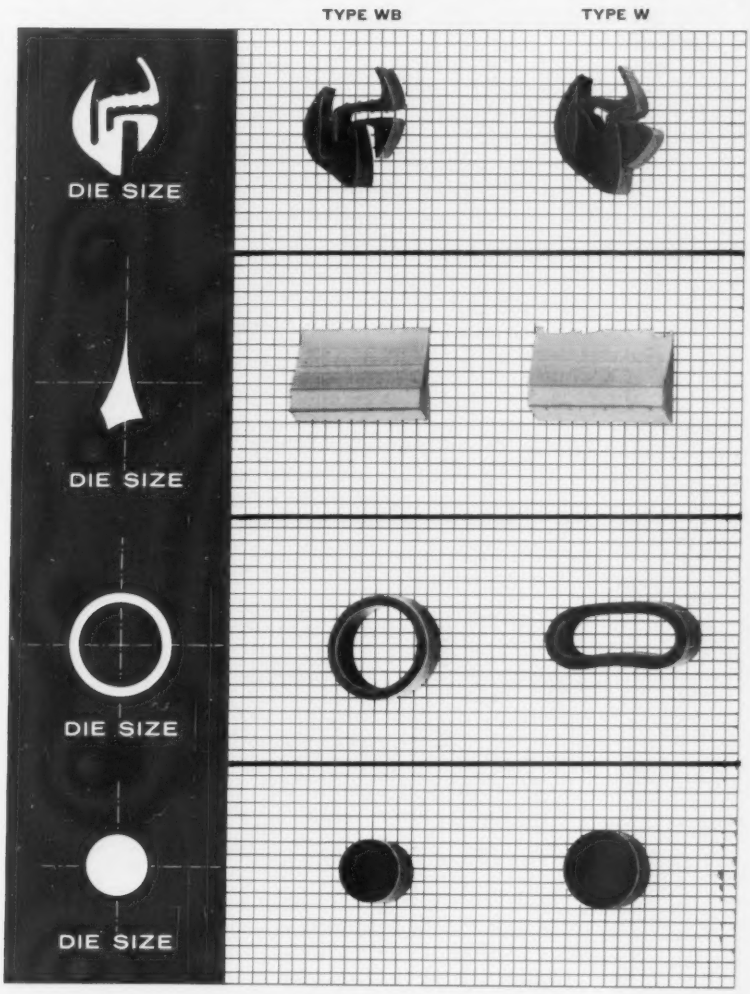
The surface of the resilient rubber teeth and the softer cushioning layer of rubber make direct contact with the harder pulley teeth, as shown in the drawing, and thereby produce a silent operating belt. The cushioning layer also protects the load-carrying band from being cut and abraided by the relatively harder pulley teeth.

The belt is provided with equally spaced rubber teeth which are bonded to one side of a softer cushioning layer of rubber. This layer has its opposite side bonded to a flexible load carrying band containing yarns extending lengthwise of the belt. Such yarns carry substantially the entire load imposed upon the belt. The yarns are so arranged that the average angle between them and the direction of movement of the belt is substantially zero. Such arrangement causes the belt to run straight on the pulleys instead of to one side as in the case where the yarns are at an angle to the belt movement. The band is made of a woven textile fabric having a thickness of .008-inch in which the yarns extending in one direction are

NEW...from Du Pont

NEOPRENE TYPE WB

Compare the photographs below. They illustrate some of the marked processing improvements offered by this new "nerve free" elastomer*



NO FUSING is encountered when Type WB is extruded from complicated dies. Notice the striking difference between the Type WB channel strip and the Type W extrusion that has fused at three points.

SHARP FEATHER EDGE obtainable with Type WB is illustrated by this Garvey extrusion. Note also the smooth surface and absence of "waviness" (nerve) in this sample. This is true even in non-black, low durometer compounds.

NO COLLAPSE is evidenced by Type WB tubing after open steam cure. Compare the two photographs. The extent of collapse displayed by the Type W tube is characteristic of most other elastomers.

EXTREMELY LOW DIE SWELL is best shown by these solid rod extrusions. Swell of the Type WB extrusion is negligible when compared with the swell of Type W and other elastomers.

These are just a few of the improved processing characteristics of Neoprene Type WB. Complete technical information has just been released in Report 58-8. If you have not received your copy, contact the District Office nearest you.

**For direct comparison, all samples were compounded alike; the only difference was in the elastomer used. All samples illustrated were cured in open steam.*

DU PONT
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PATENT REVIEW

arranged longitudinally to the belt, and other yarns are arranged transversely. Since the transverse yarns carry no load, they may be relatively weak and widely spaced.

Butyl Rubber-Silica Composition

U. S. PATENT 2,821,516, issued January 28, 1958 to Ralph F. Wolf and assigned to Columbia-Southern Chemical Corp., describes the production of silica-reinforced butyl rubber compositions which do not exhibit a bloom.

It has been found that bloom can be avoided in butyl rubber stocks which contain no carbon black by effecting a vulcanization of the butyl rubber-siliceous pigment composition containing a lower than normal concentration of elemental sulfur and up to 2.5 parts by weight of a dimorpholine polysulfide, such as 4,4′-dithiodimorpholine. The siliceous pigments which are used are finely divided pulverulent materials containing in excess of 85% SiO_2 by weight on the water-free basis, and having an average ultimate particle size in the range of 0.01 to 0.05 micron.

By far the strongest rubber compositions have been produced using finely divided silica which contains an excess of 85% SiO_2 on the water-free basis. Such silicas usually have a surface area in the range of about 50 to 250 square meters per gram. They may contain small amounts of metallic components such as CaO, Al_2O_3, MgO, ZnO or the like, usually in chemical combinations.

Other Patents Of Interest

Subject	Inventor or Assignee	Patent No.	Date
Stabilization of rubber with dihydro-carbon-tin dialcoholates or diphenolates	Metal & Thermit Corp.	2,798,862	7/9/57
Chlorinated organotin rubbery compositions	Metal & Thermit Corp.	2,798,863	7/9/57
Tire painting device	Victor A. Leslie	2,800,874	7/30/57
Method of molding rubber	Richard C. Weiss	2,801,150	7/30/57
Manufacture of sponge rubber from foamed rubber latex	United States Rubber Co.	2,801,274	7/30/57
Tire buffing and recapping apparatus	Ralph R. Reading	2,805,699	9/10/57
Chemical blowing of rubber	United States Rubber Co.	2,806,073	9/10/57

Copies of any patents, including those described here, are available from the Commissioner of Patents, Washington 25, D. C., for 25 cents each. Do not send stamps.

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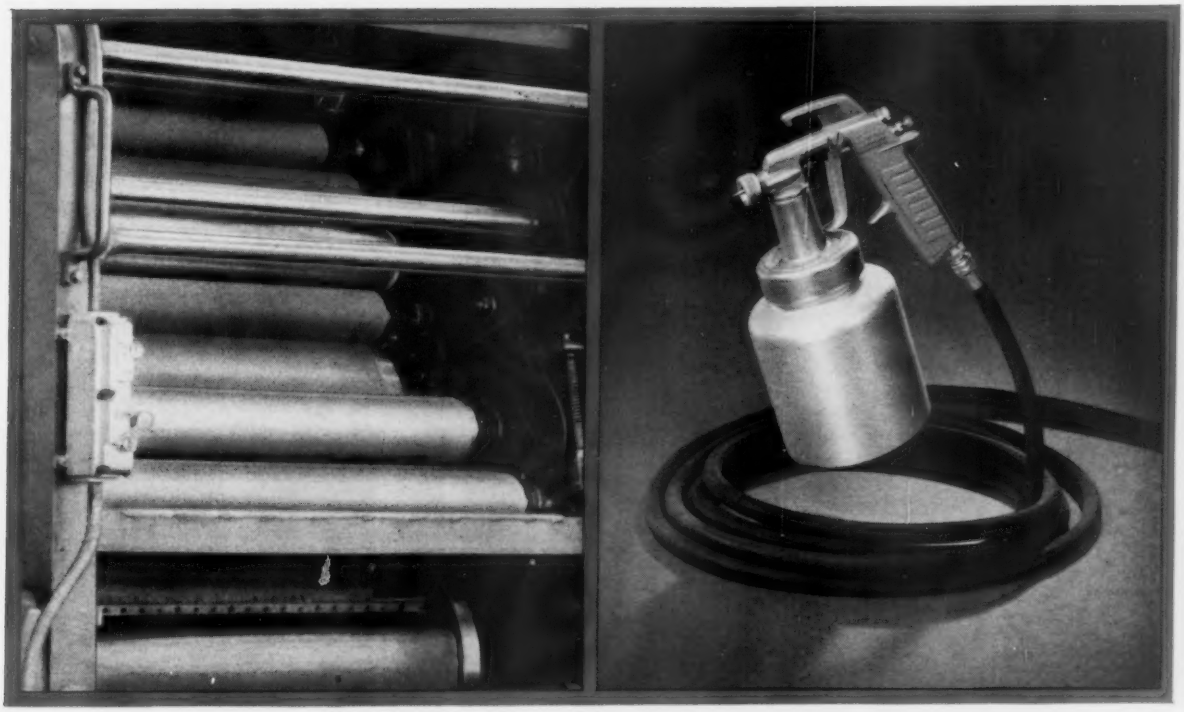

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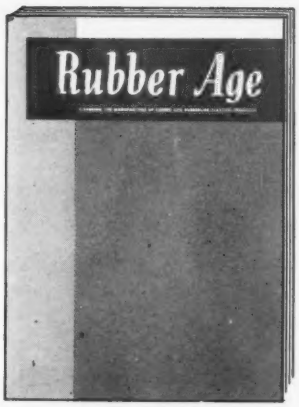

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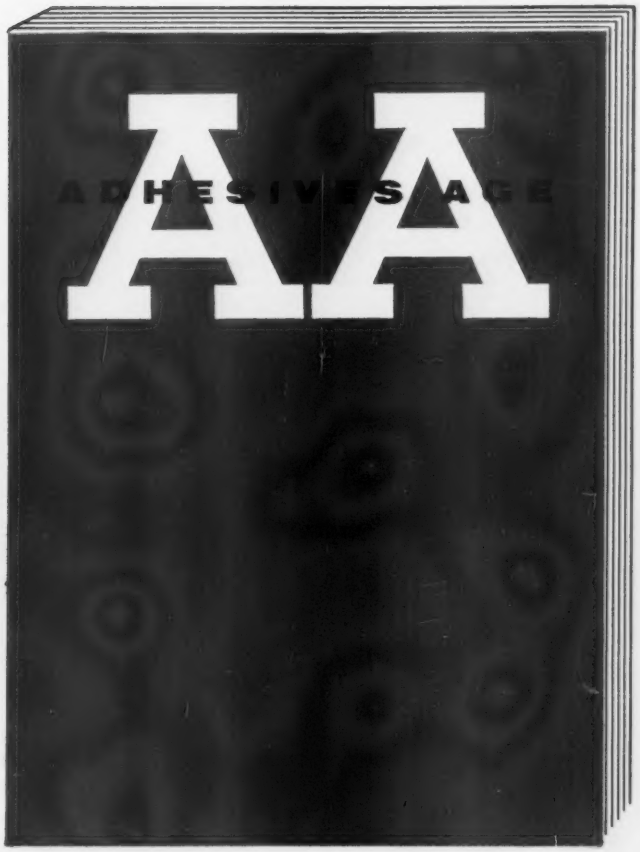

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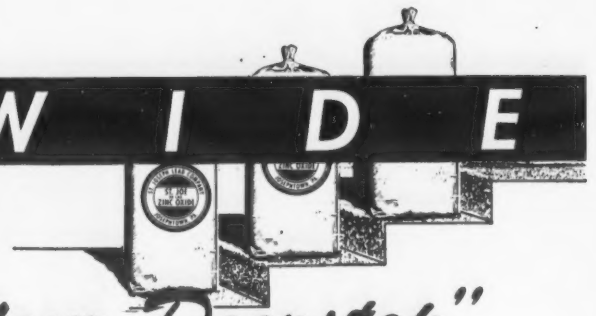

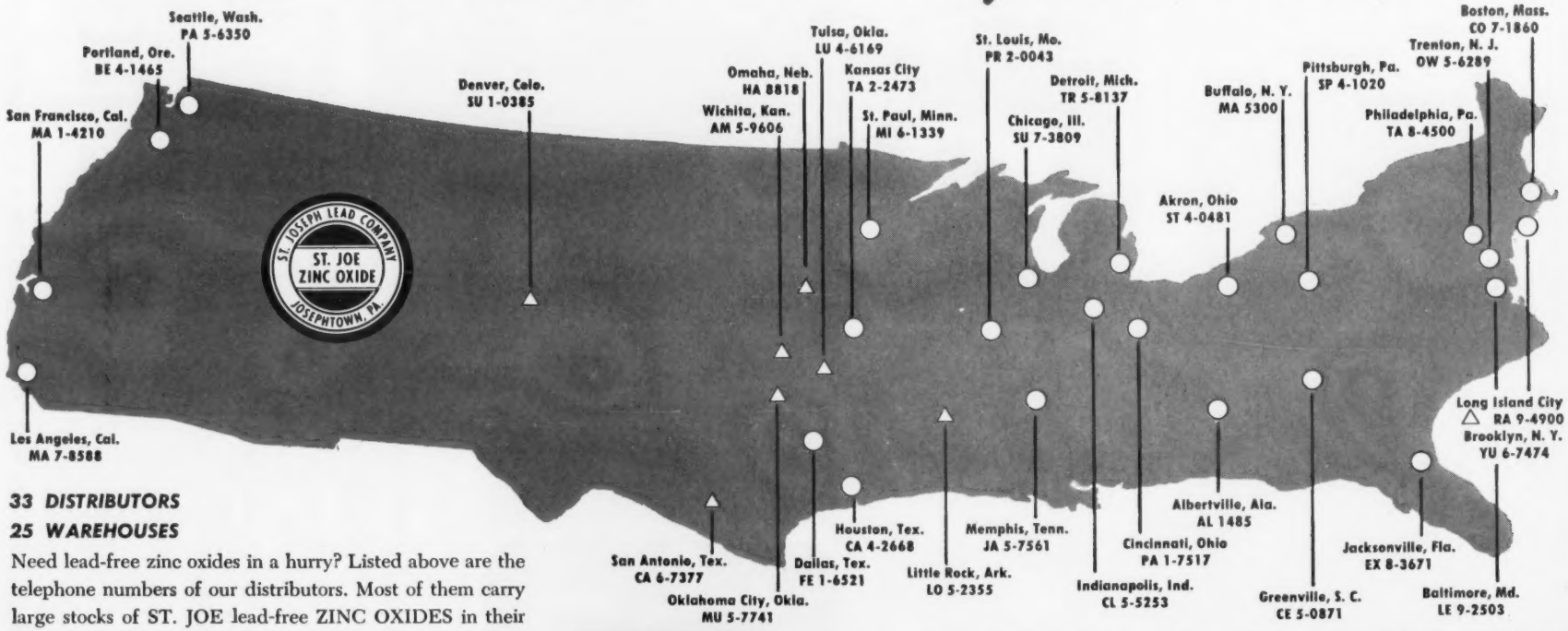

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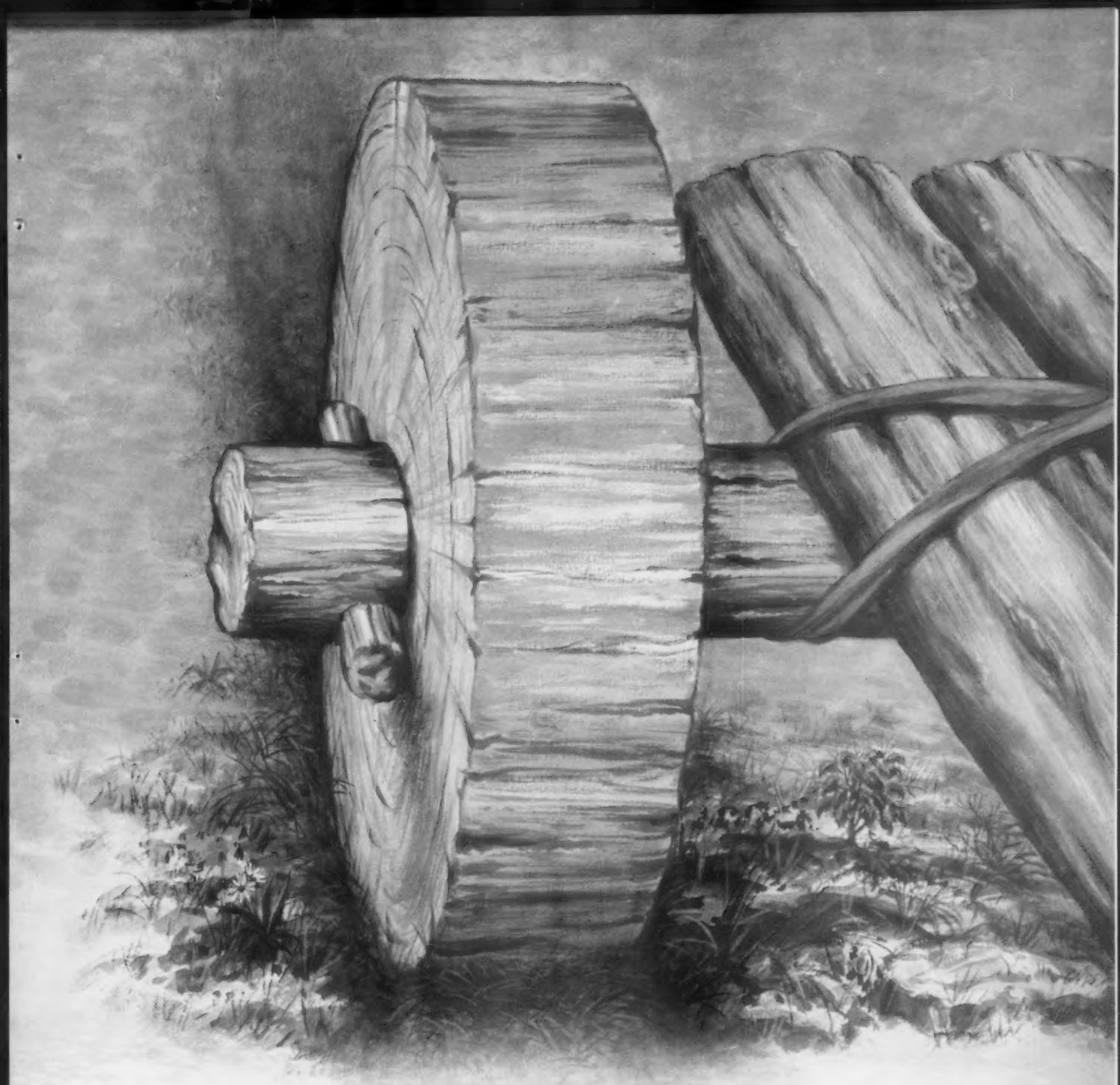

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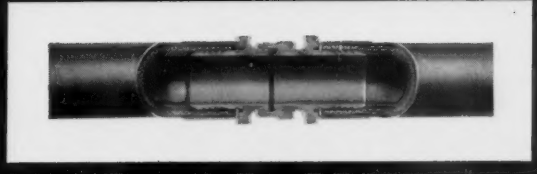

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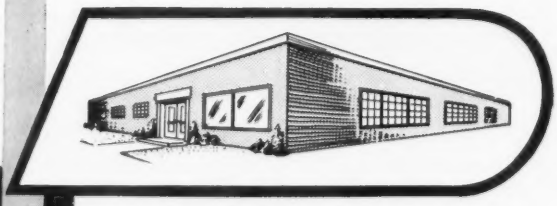

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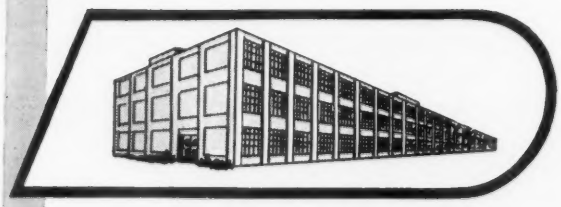

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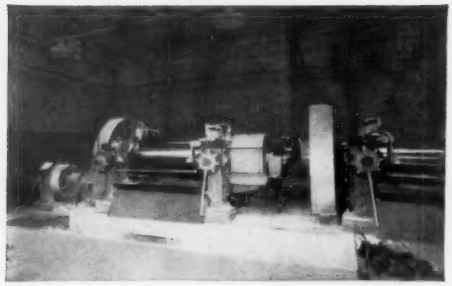

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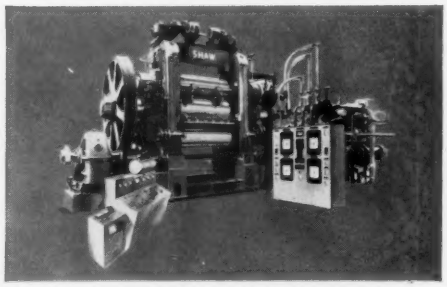

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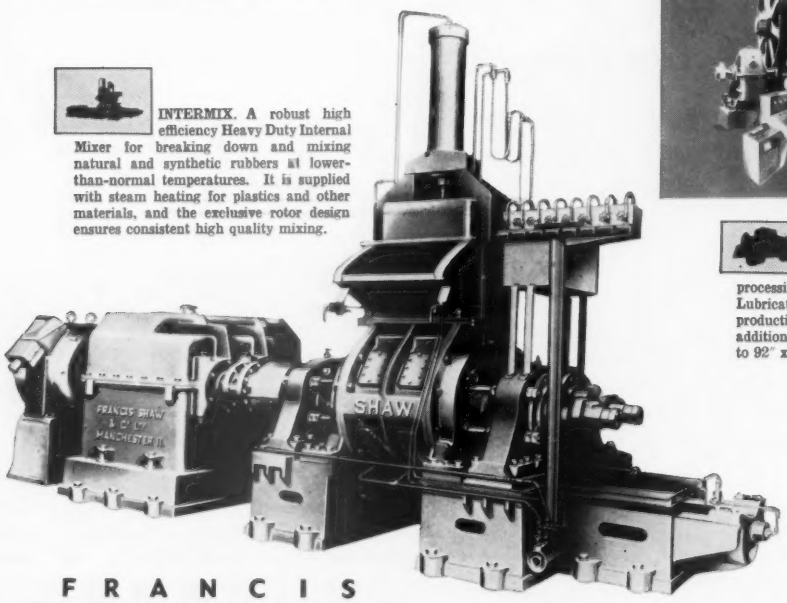

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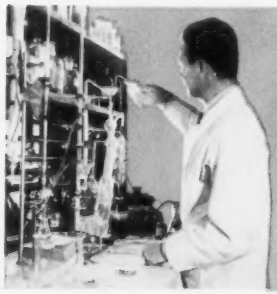

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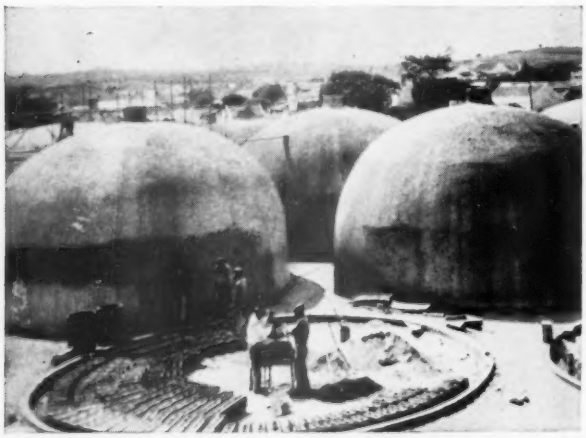

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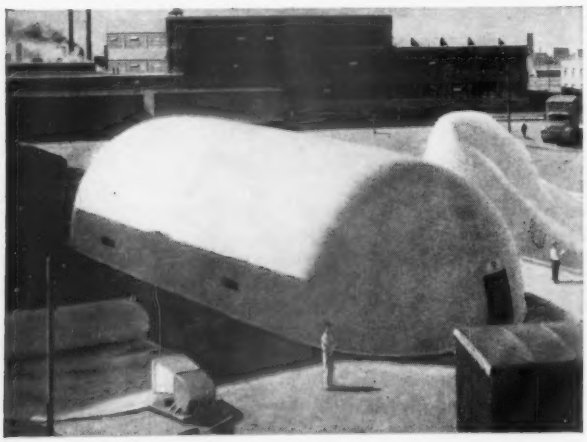

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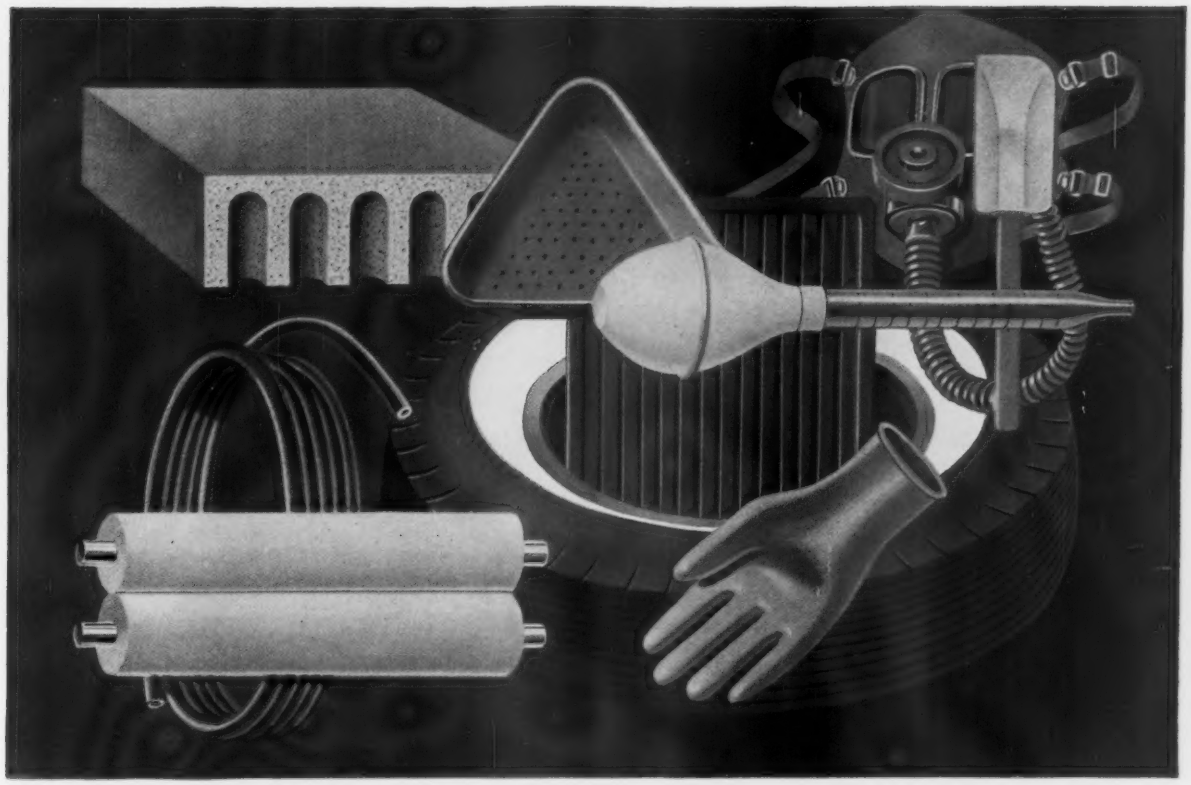

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Natural rubber, SBR polymers, regular and WHV neoprenes, acrylonitrile polymers	**SUNDEX 85**	It's especially recommended for very high loadings of WHV neoprene (from 75 to over 100 parts Sundex 85 to 100 parts polymer). Used in hard rubber goods.

For further information and a list of Sun offices, consult Chemical Materials Catalog or Rubber Red Book.

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Industrial Products Department

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These beautiful forms, with deep-hole pattern, will enable you to make gloves that will not slip in use. We will reproduce any pattern you desire from your own design, or we will suggest design for your approval.

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TRENTON 8, NEW JERSEY

Overseas

Paris—U. S. Rubber Co. and Ugine S. A., French chemicals manufacturer, have signed a licensing agreement giving Ugine exclusive rights in France to make special rubbers, latex and plastics from butadiene. U. S. Rubber will provide technical assistance and know how.

The Hague—Two synthetic rubber plants will be built in the Netherlands. B. F. Goodrich and Algemene Kunstzijde Unie N. V. of Arnhem, have formed a jointly owned company which will construct a plant at Arnhem. Shell Pernis Chemische Fabrieken N. V. will build the second plant at Pernis. Shell's plant will produce a general purpose rubber at a rate of at least 50,000 tons annually. The Goodrich plant will produce principally Goodrich special purpose Hycar nitrile latex.

Bologna—Compagnia Italian Nest-Pak S. P. A., Bologna, has licensed the American company, Pantasote, to produce plastic packaging materials developed in Italy. Pantasote will make the materials in its Passaic, N. J., plant under the trade-mark "Panta-Pak".

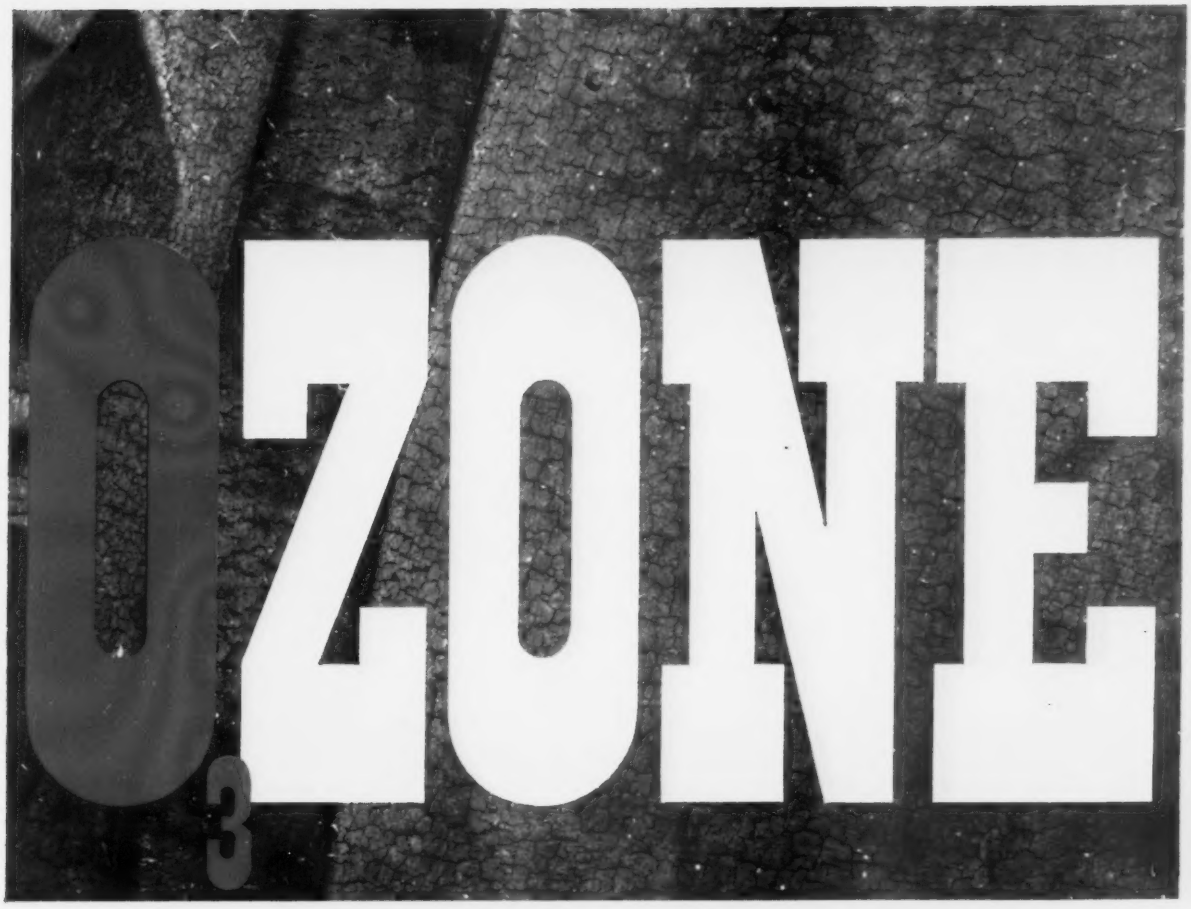
Vienna—A joint petrochemical production company "Danubia Petro-Chemie A G", will be formed in Austria by the Italian Montecatini Co. and the Austrian Nationalized Oesterreichische Stickstoffwerke A G, according to an official announcement. The planned construction of a petrochemical plant in Schwechat, near Vienna, is still pending the approval of the Austrian Holding Co. for National Enterprises IBV. This approval is expected to to be granted soon.

London—Productofoam Rubber Co. (London) Ltd., and Latex Surgical Products, Ltd., have moved into newly erected factory premises at Preston Works, Sheep Lane, Hackney, London E. 8. The firms expect increased output to result from installation of new machinery and establishment of modern working conditions.

Djakarta—The Djakarta government has signed a $12 million trade agreement with Red China in which Indonesia will receive 20,000 tons of rice plus a substantial amount of Chinese cloth in return for tin and rubber, both needed in China's industrial expansion.

Milan—Montecatini, the Italian chemical firm, has been engaged by Development and Resources Corp., New York, N. Y., to help establish a polyvinyl chloride plant at Ahwaz in Iran. Scheduled for completion in early 1961, the plant will produce nine million pounds of PVC annually. Estimated cost of the PVC plant is $6,500,000.

Duesseldorf—The Third International Fair of the plastics industry in Germany, called "Kunstoffe '59", will be held in Duesseldorf, October 17 to 25, 1959. To be international in all respects, the fair will be extended to include raw materials as well as finished goods.



How to arrest its attack on rubber products

Ozone attack is now recognized as the major cause of cracking and checking in stressed rubber products.

The mechanism of this type of deterioration is attributed to the chemical attack of ozone upon the carbon-to-carbon double bonds of unsaturated elastomers. Through a rather complex reaction the double bond is broken. This places additional stress upon adjacent chains and increases their sensitivity to ozone attack. Thus a continuing reaction occurs, leading to the development of fissures perpendicular to the direction of the stress.

To combat the deteriorating effects of ozone, rubber chemists have several approaches open to them:

(1) Addition of waxes which migrate to surface areas

(2) Protection of surface areas with an inert coating

(3) Incorporation of antiozonants

Of these three methods, the use of antiozonants is the most effective for rubber products under stress. Antiozonants are easily incorporated into the rubber during processing and slowly exude to the surface during use. Because they interrupt the chain-breaking reaction between ozone and unsaturated elastomers, antiozonants provide a continuing protection which cannot be equalled by any physical method.

Eastman's Eastozone antiozonants protect rubber products more effectively at lower cost than do other types of commercially-used antiozonants. Using Eastozone antiozonants, compounders often can cut antiozonant requirements in half and still get the same ozone resistance, measured by static or dynamic exposure tests.

Give your mechanical goods or tire stocks maximum service life at minimum cost by incorporating Eastozone antiozonants in your rubber recipes. Ask your Eastman representative for samples and a copy of Bulletin 1-102 "*Eastozone Antiozonants for the Rubber Industry*" or write to EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

Chemical Description of Eastman Antiozonants

Eastozone 30 ..... N, N'-Di-2-octyl-p-phenylenediamine
Eastozone 31 ..... N, N'-Di-3-(5-methylheptyl)-p-phenylenediamine
Eastozone 32 ... N, N'-Dimethyl-N, N'-di-(1-methylpropyl)-p-phenylenediamine

Eastozone Eastman Rubber Antiozonants

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; New York City; Framingham, Massachusetts; Cincinnati; Cleveland; Chicago; St. Louis; Houston. **West Coast: Wilson Meyer Co.,** San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

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OVERSEAS (CONT'D)

Edinburgh—North British Rubber, a U. S. Rubber subsidiary, has started construction of a modern hose factory in Edinburgh, Scotland, which will produce a range of hose for use in oil fields and high pressure hose for the British market. Other items to be produced are transmission belting, vinyl plastic flooring, nonslip driving belts, molded plastics and sponge products.

Djakarta—A recent dock fire at the harbor of Medan is believed to have destroyed some 2,000 tons of crude rubber although the extent of the loss has not been announced. The fire lasted 36 hours.

Singapore—A letter received by the Singapore Rubber Trade Association from the China Importers and Exporters Corp. warns Singapore exporters that Chinese rubber manufacturers will buy less Malayan rubber if the quality continues to deteriorate. The letter complains that rubber shipped to China has been deteriorating since 1956 and that this inferior rubber has affected Chinese industrial production.

Bonn—Farbenfabriken Bayer will market polycarbonate-based plastics mainly for foils to be used in the electrical, textile, pharmaceutical, television and photographic industries at a plant to be built at Urdingen, near Krefeld. The company has also announced that jointly with Farbewerke Hoechst, it is starting the manufacture of chloroprene synthetic rubber at an initial capacity of 12,000 to 15,000 tons a year.

London—A special V-belt test plant will be built by Heenan and Froude Ltd., Worcester, for BTR Industries, Ltd., Burton-on-Trent. The test plant will be driven by a 15 hp Heenan electric dynamometer, the power being transmitted by the V-belts undergoing test to a Froude hydraulic dynamometer. Provision has been made for applying known tensions to the belts by means of weights and for measuring and taking up the amount of belt stretch.

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GENERAL MANAGER RUBBER PLANT
$15,000 a year including bonus

AGGRESSIVE, successful manager who grew up in production of precision molded and extruded items in plant of moderate size. He has progressed through production and sales into general management. He has initiative and is aggressive, but finds his promotion and future presently blocked. Such a man will now find a real opportunity with this expanding producer and merchandiser of quality molded and extruded rubber products. Eastern Location.

QUALIFICATIONS: Age 35-45. *Education* – degree level including some engineering and business administration. *Experience* – rubber production (6 years); sales (2 years); record as a proven producer in general management (2 years).

Submit complete resume of education, experience, earnings to
Personnel Manager
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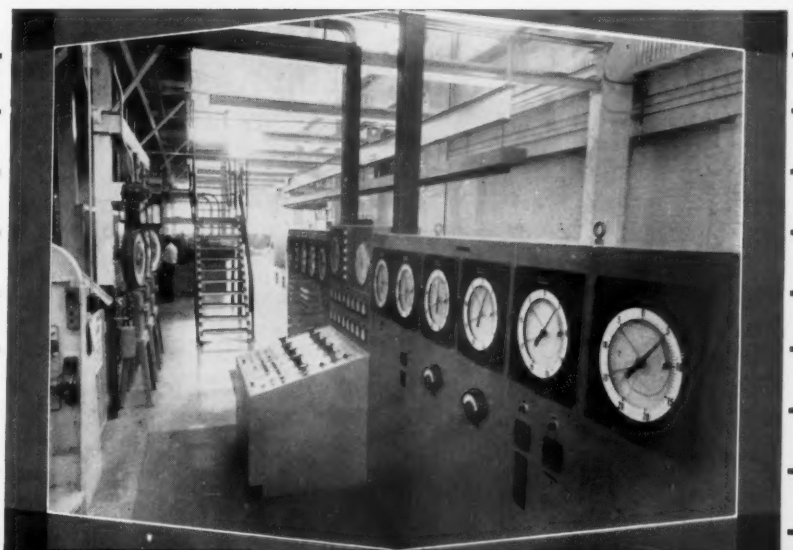

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Physical Properties of Carbium

Linseed Oil Absorption, cc/100 grams	30-35
Packed Density, lbs./cu. ft.	66-73
Specific Gravity	2.65
Color	White
Particle Size, microns	1-10

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COLD	PHILPRENE 1500 PHILPRENE 1502 PHILPRENE 1503	PHILPRENE 1601 PHILPRENE 1605
COLD OIL	PHILPRENE 1703 PHILPRENE 1706 PHILPRENE 1708 PHILPRENE 1712	PHILPRENE 1803 PHILPRENE 1805

Each of the many Philprenes is tops in his act! Philprene 1605, for example, is a star performer in calendering and extrusions. And Philprene 1500 is famous for strength, for superior wear resistance and for outstanding physical properties, too.

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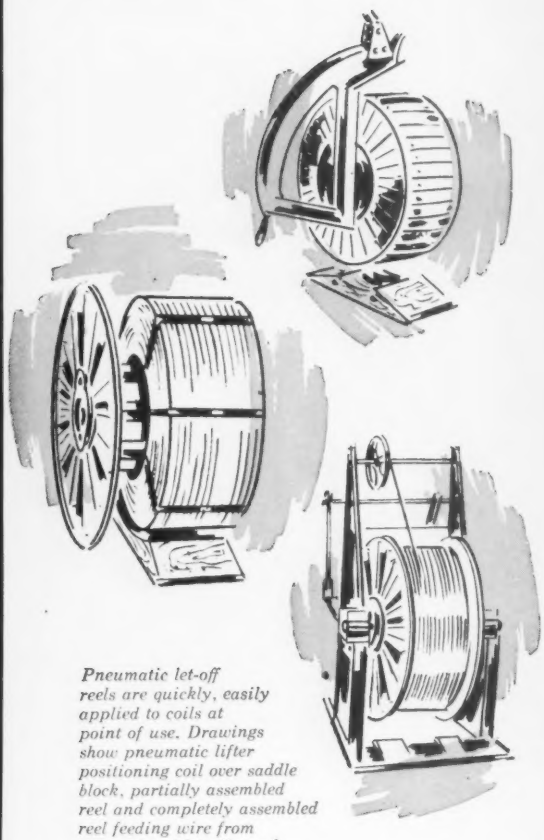
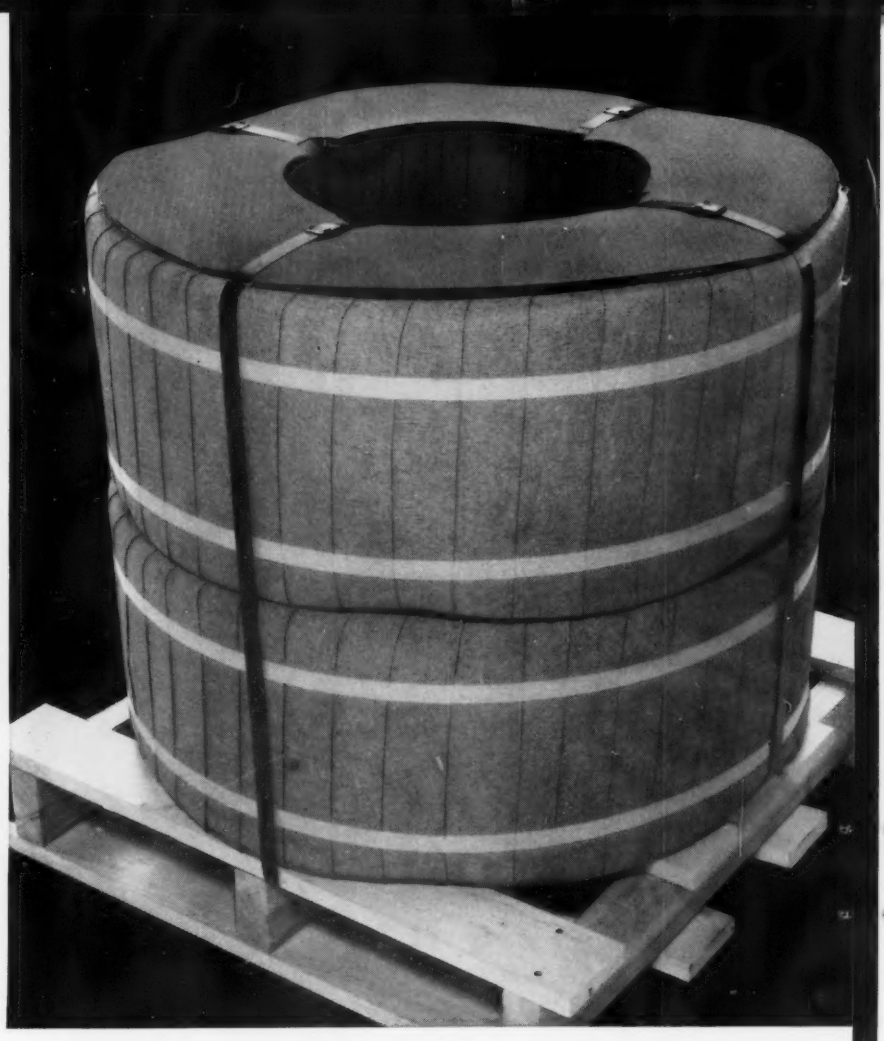


Pneumatic let-off reels are quickly, easily applied to coils at point of use. Drawings show pneumatic lifter positioning coil over saddle block, partially assembled reel and completely assembled reel feeding wire from conventional let-off stand.



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BLACK MASTERBATCH

* Commercial Process Developed by Texas-U.S. Chemical Co., Based on Columbian Method.

Now 3 ultra-dispersed black masterbatches commercially proved and available

AFTER MANY MONTHS of actual commercial production...production of millions of pounds... Texas-U.S. Chemical Company announces the commercial availability of mechanically mixed, ultra-dispersed black masterbatches.

Unlike previous masterbatches in which the carbon black is dispersed by use of surface-active agents, the new TEXUS Black SYNPOLS are produced by an extremely effective *mechanical* mixing process, which achieves better Black dispersion and a stronger carbon-polymer bond. *No* dispersing agents, coagulating salts or other foreign materials, which detract from masterbatch physical properties, are introduced.

Commercially Proved

Perfected and produced on full-scale plant production lines, the new Black SYNPOLS assure rubber processors all the advantages of a *commercially proved* product. These new Black SYNPOLS can be adopted for product manufacture with confidence in their uniformity and adherence to commercial production specifications. This eliminates all the costly uncertainties of working with materials produced in pilot-scale operations.

In addition to the long sought-for advantages which may be realized by the reduction of carbon black agglomerates—such as improved tread life due to less tread cracking and higher physical properties,

TEXUS Black SYNPOLS offer . . .

IMPROVED RUBBER-CARBON BOND—by eliminating dispersing agents and coagulating salts.

MIXING ECONOMIES—lower power consumption and shorter mix cycles.

PREMIUM QUALITY—low ash content equivalent to premium rubbers.

UNIFORMITY—fully proved production process assures the uniformity of quality found in all TEXUS SYNPOLS.

Experimental tires based on the new SYNPOL masterbatches were first produced last year and have been undergoing severe service tests since that time. Results to date have been so significant that millions of pounds of the new Black SYNPOLS have already been used in *commercial* tire production.

Learn first hand the important advantages these new SYNPOL masterbatches offer. Your local TEXUS representative can give you full information and arrange for *immediate* delivery of your needs, from samples to full carload quantities. Call him today, or write to Naugatuck Chemical, Naugatuck, Conn.—SYNPOL Sales Agent.

TEXUS

SYNPOL BLACK MASTERBATCHES NOW AVAILABLE

	Rubber	Black	Oil
SYNPOL 8150	100 pts. 1500 Type	50 pts. HAF	None
SYNPOL 8250	100 pts. 1703 Type	50 pts. HAF	25 pts. Highly Aromatic
SYNPOL 8251	100 pts. 1711 Type	75 pts. HAF	37.5 pts. Highly Aromatic

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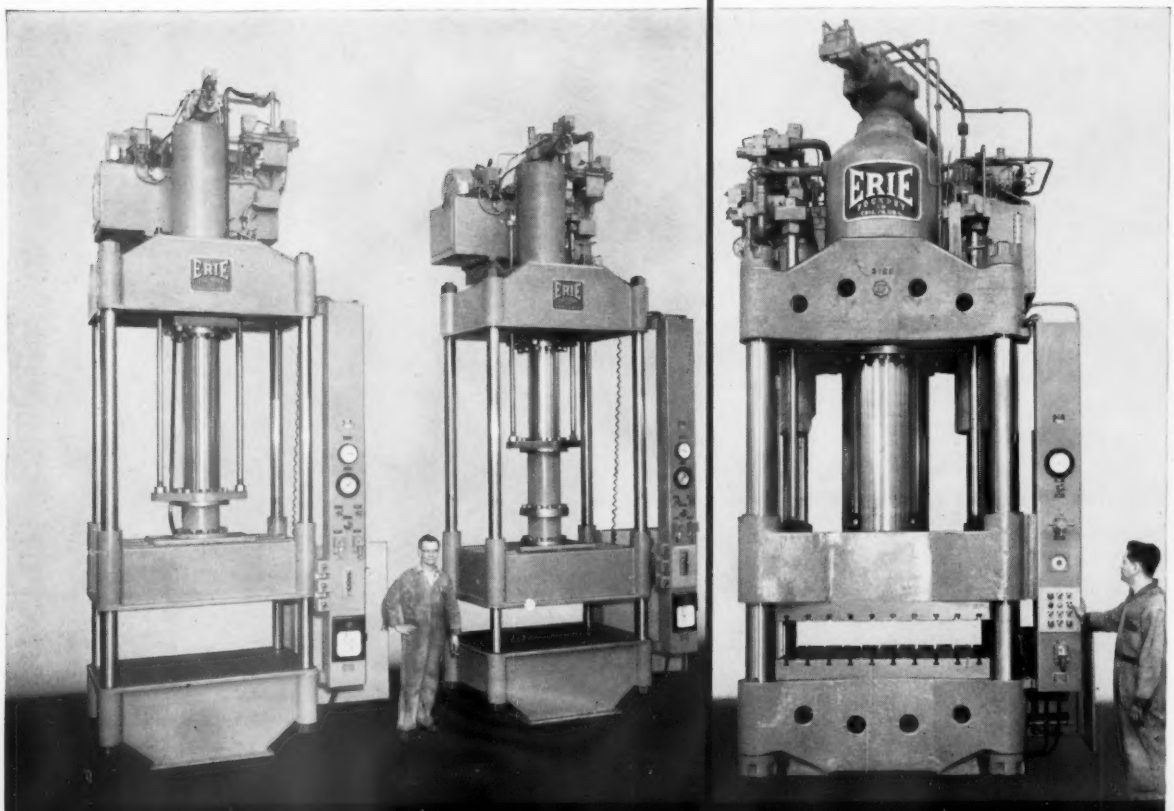
This very rugged fiberglass press is rated 750 tons with a 48″ stroke. The two pull backs give 150-ton stripping capacity. Oil Gear drive with quick-acting prefill system allows molders to utilize five ram speeds in their molding cycle. Automatic short stroking of pump at required pressures for long periods of time assures both reduced h.p. consumption and oil heating. Controls are semi-automatic, and the 2 steam-heated platens are 60″ x 46″.



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Whatever rubber or plastic product you make, you may find a better way to make it—or a way to make it better—by talking with a UNION CARBIDE Silicones Man. Contact our distributor, C. P. Hall Co., with offices in major cities, or write Dept. GR-4802, Silicones Division, Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. *In Canada:* Bakelite Company, Division of Union Carbide Canada Limited, Toronto 7, Ontario.

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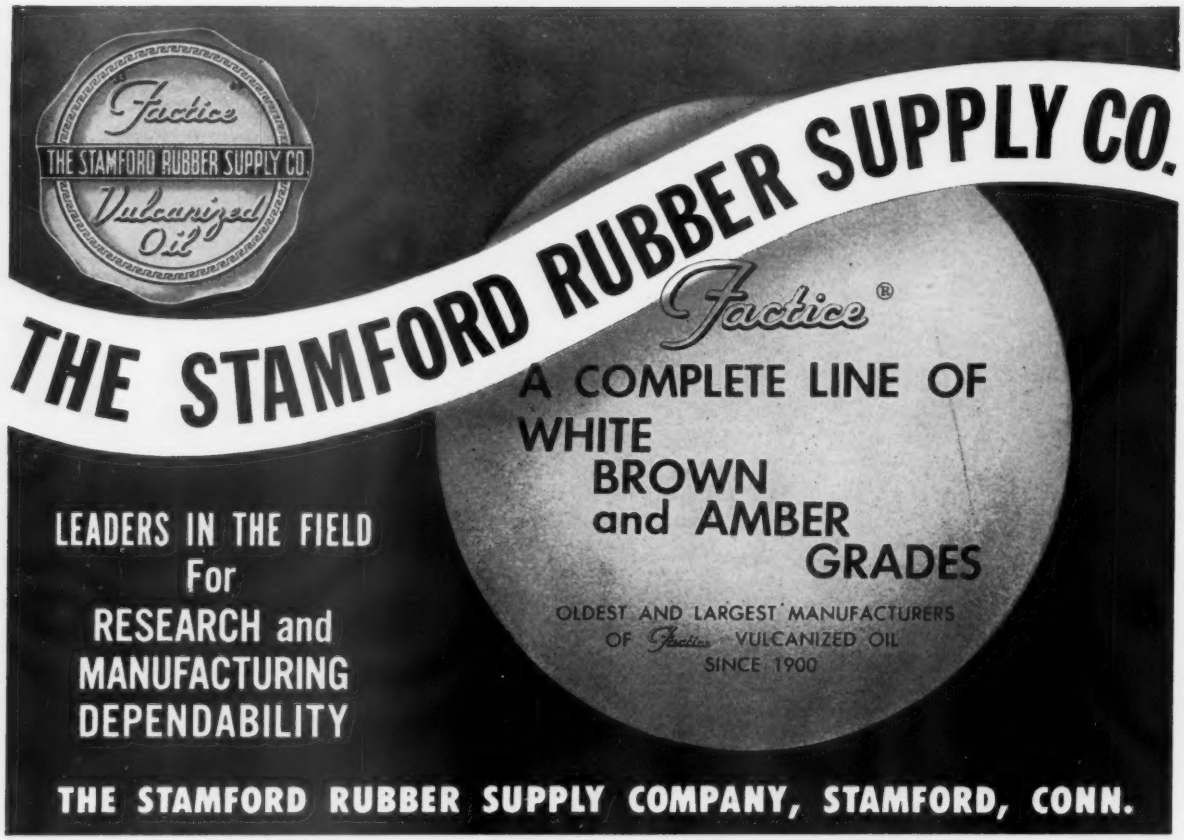

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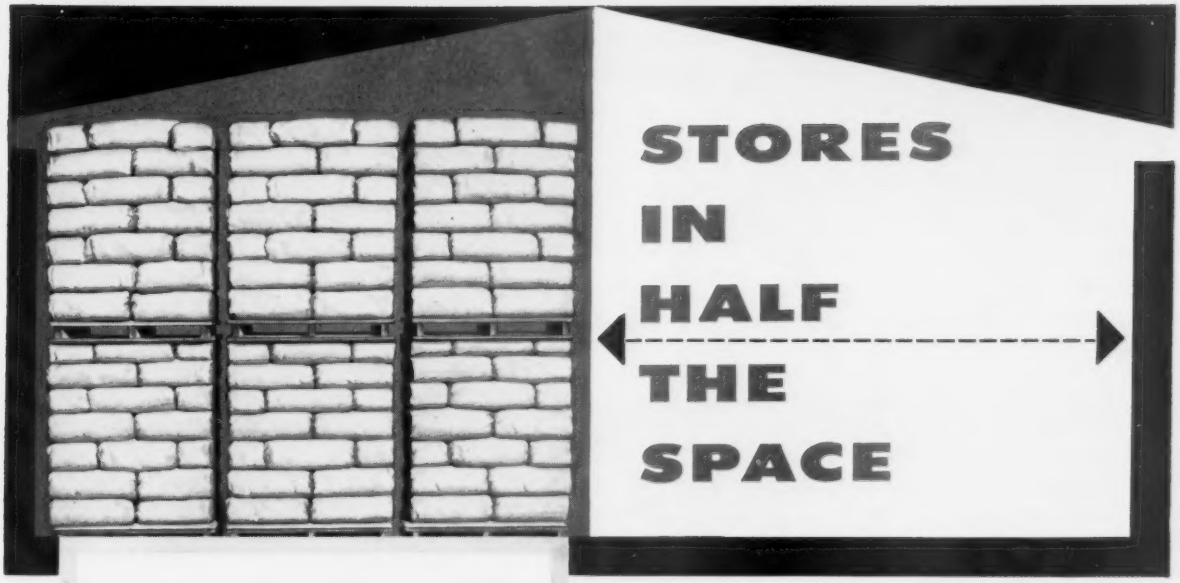

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COMING

July 25. Chicago Rubber Group, Golf Outing, Medinah Country Club, Medinah, Ill.

Aug. 5. New York Rubber Group, Golf Outing, Wingfoot Golf Club, Mamaroneck, N. Y.

Aug. 22. Philadelphia Rubber Group, Golf Outing. Manufacturers Golf & Country Club, Oreland, Penna.

Sept. 6. Connecticut Rubber Group, Summer Outing.

Sept. 10-12. Division of Rubber Chemistry, A.C.S., Fall Meeting, Hotel Sherman, Chicago, Ill.

Sept. 19. American Society for Quality Control, San Francisco Bay Area Quality Control Conference, Stanford, Calif.

Sept. 25. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Oct. 3. Detroit Rubber & Plastics Group, Fall Meeting, Detroit-Leland Hotel, Detroit, Mich.

Oct. 7. Los Angeles Rubber Group, Biltmore Hotel, Los Angeles, Calif.

Oct. 9. Southern Ohio Rubber Group, Fall Technical Meeting, Gibbons Hotel, Dayton, Ohio.

Oct. 14. Buffalo Rubber Group, Hotel Westbrook, Buffalo, N. Y.

Oct. 16. Boston Rubber Group, Fall Meeting, Hotel Somerset, Boston, Mass.

Oct. 17. New York Rubber Group, Fall Meeting, Henry Hudson Hotel, New York, N. Y.

Oct. 17-18. Southern Rubber Group, Roosevelt Hotel, New Orleans, La.

Oct. 24. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

Oct. 24. Akron Rubber Group, Sheraton Hotel, Akron, Ohio.

Nov. 14. Connecticut Rubber Group.

EVENTS

Nov. 17-21. Society of the Plastics Industry Annual National Conference, Morrison Hotel, Chicago, Ill.

Nov. 21. Philadelphia Rubber Group, Fall Dance, Manufacturers Golf & Country Club, Oreland, Penna.

Nov. 30-Dec. 5. A.S.M.E. Annual Meeting, Hotel Statler, New York, N. Y.

Dec. 2. Buffalo Rubber Group, Xmas Party.

Dec. 4. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Dec. 12. Detroit Rubber & Plastics Group, Xmas Party, Sheraton-Cadillac Hotel, Detroit, Mich.

Dec. 12. New York Rubber Group, Xmas Party.

Dec. 13. Southern Ohio Rubber Group, Winter Meeting, Miami Valley Country Club, Dayton, Ohio.

Jan. 23, 1959. Akron Rubber Group, Sheraton Hotel, Akron, Ohio.

Jan. 30-31, 1959. Southern Rubber Group, Statler Hotel, Dallas, Texas.

Feb. 12, 1959. Fort Wayne Rubber & Plastics Group, Winter Meeting, Van Orman Hotel, Fort Wayne, Ind.

April 3, 1959. Akron Rubber Group, Sheraton Hotel, Akron, Ohio.

April 16, 1959. Fort Wayne Rubber & Plastics Group, Spring Meeting, Van Orman Hotel, Fort Wayne, Ind.

May 12-15, 1959. Division of Rubber Chemistry, A.C.S., Spring Meeting, Biltmore Hotel, Los Angeles, Calif.

Nov. 9-13, 1959. Joint International Meeting of Division of Rubber Chemistry, A.C.S.; Committee D-11, A.S.T.M., and Rubber and Plastics Division, A.S.M.E., Shoreham Hotel, Washington, D. C.

May 24-27, 1960. Division of Rubber Chemistry, A.C.S., Spring Meeting, Statler Hotel, Buffalo, N. Y.

Sept. 13-16, 1960. Division of Rubber Chemistry, A.C.S., Fall Meeting, Commodore Hotel, New York, N. Y.

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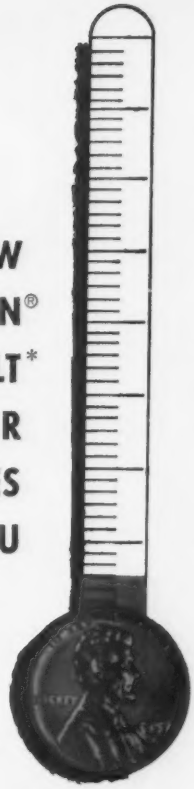

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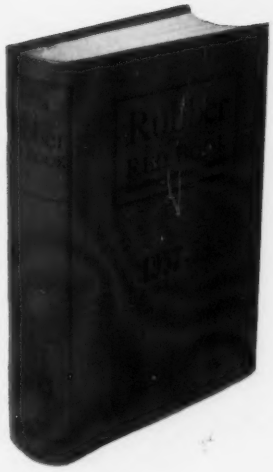

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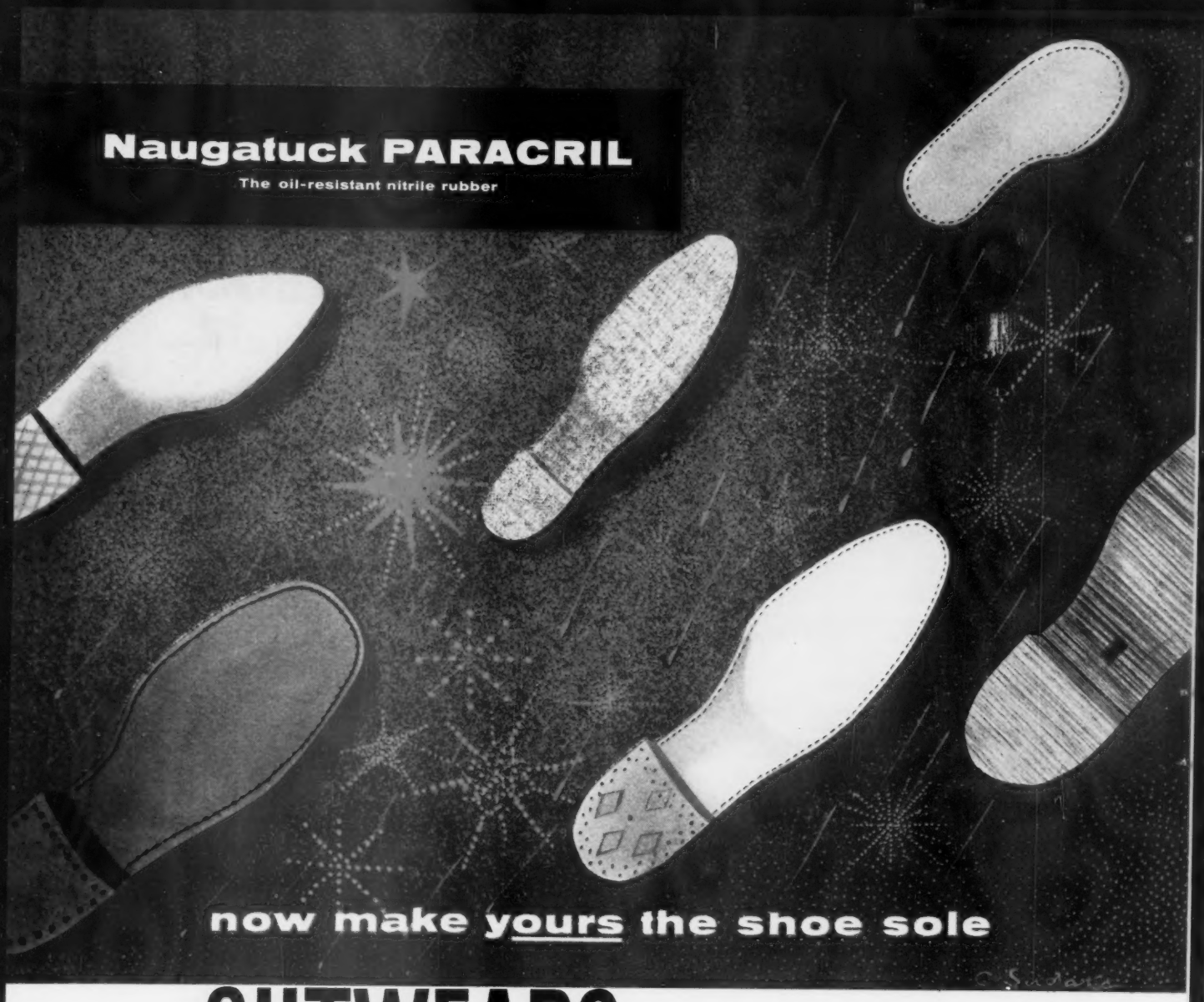

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Rubber Age

Vol. 83, No. 4 July, 1958

Properties of Fluorocarbon Elastomer 214

Evaluation of the chemical resistance and thermal stability of a new elastomer as influenced by peroxide, amine and HMDA Carbamate curing systems

By ANGUS WILSON, C. B. GRIFFIS and J. C. MONTERMOSO

Quartermaster Research and Engineering Center, U. S. Army, Natick, Mass.

MILITARY needs require the development of new elastomeric materials. The development of new weapon systems continually extends the operating temperatures for elastomers. Applications in many cases require use at extreme high temperatures in air as well as in direct contact with fuels and lubricating oils. Commonly used elastomers fail either from the heat or fluid contact, or from a combination of both. Among the available materials presently used under these conditions are the fluorocarbon rubbers, known by the trade names Kel-F Elastomers 3700 and 5500.

Recently M. W. Kellogg Co.,* in conjunction with the Quartermaster Corps, U. S. Army, developed a new fluorocarbon elastomer. This material, designated here as Fluorocarbon Elastomer 214, is a 70/30 copolymer of vinylidene fluoride and perfluoropropene. In early tests it showed combined chemical resistance and thermal stability superior to that of Kel-F Elastomers 3700 and 5500. Evaluation of Fluorocarbon Elastomer 214 was carried out with emphasis on testing for those properties. Kel-F Elastomer 3700 was used as a standard for basis of comparison.

Stocks were made from Fluorocarbon Elastomer 214 and Kel-F Elastomer 3700 using curing systems found suitable for both polymers. The commonly used peroxide and amine systems were chosen as well as a new one, HMDA Carbamate. (This material is designated as an inner salt of hexamethylene diamine.) The formulas used are shown in Table I. There was no difficulty experienced in processing Fluorocarbon Elastomer 214.

After molding and curing, the physical properties of the stocks at room temperature were determined. The tensile strength and per cent elongation were determined with an Instron Tester using dumbbell-shaped test specimens, 3¾ inches in length with a constricted section 1.125-inches long and 0.125-inch wide. The physical properties at room temperature are given in Table II. Higher tensile strength was obtained with the amine and carbamate cures for the Kel-F Elastomer 3700.

TABLE I—FORMULAS AND CURING HISTORIES OF TEST STOCKS

	Peroxide Cure		Amine Cure		HMDA-Carb. Cure	
Fluorocarbon Elastomer 214	100	—	100	—	100	—
KEL-F Elastomer 3700	—	100	—	100.0	—	100.0
Hi-Sil 202	10	10	15	10.0	10	8.9
Zinc Oxide	5	5	10	5.0	5	4.4
Dyphos	—	—	10	10.0	10	8.9
Cadox BCP	9	9	—	—	—	—
Triethylene Tetramine	—	—	2	2.5	—	—
HMDA-Carbamate	—	—	—	—	2	2.7
Press Cure, (Minutes/°F.)	60/240	60/240	30/320	60/260	30/320	30/320
Oven Cure, (Hours/°F.)	16/250	16/250	16/350	16/250 16/300 16/350	16/350	16/350

Note: This paper was presented before the Division of Rubber Chemistry, A.C.S., Montreal, Canada, May 17, 1957.

* Editor's Note: At the time this research was conducted the Kel-F line of fluorocarbon elastomers was owned by M. W. Kellogg Co. Recently Minnesota Mining and Manufacturing Co., St. Paul, Minn., purchased the Kel-F properties from M. W. Kellogg Co.

TABLE II—ORIGINAL PHYSICAL PROPERTIES OF FLUOROCARBON ELASTOMER VULCANIZATES AT 75±1°F.

	Peroxide Cure		Amine Cure		HMDA-Carb. Cure	
Fluorocarbon Elastomer No.	214	3700	214	3700	214	3700
Tensile strength (psi)	2830	2980	1680	2140	1710	2640
Ultimate Elongation (%)	500	240	150	340	265	395
Stress at 300% Elongation (psi)	1160	—	—	2110	—	1830
Hardness, Shore A, 5 Sec. Reading	65	62	80	69	65	65

TABLE III—PER CENT VOLUME INCREASE OF FLUOROCARBON ELASTOMERS IN VARIOUS FLUIDS AFTER 48 HOURS AT 75±1°F.

	Peroxide Cure		Amine Cure		HMDA-Carb. Cure	
Fluorocarbon Elastomer No.	214	3700	214	3700	214	3700
Test Fluid						
Fluid III	1	5	1	5	0	4
SAE 50 Motor Oil	0	1	0	0	—1	0
Turbo Oil 15	—2	49	—2	54	—2	49
MLO 8200	—2	—1	—1	—2	0	—3

Chemical Resistance Studies at Room Temperature

The fluorocarbon elastomers are resistant to most organic fluids and solvents as well as to strong oxidizing agents. The cured materials were immersed in a number of such fluids for 48 hours at room temperature and the per cent volume swell determined. The results as listed in Table III show Fluorocarbon Elastomer 214 to be equal or slightly superior to Kel-F Elastomer 3700 in Fluid III (70% isooctane, 30% toluene), SAE 50 motor oil, and in silicate ester oil, MLO 8200. In Turbo Oil 15, a diester oil, Fluorocarbon 214 was much superior to Kel-F Elastomer 3700. The type of cure used had no apparent effect on the resistance to the fluids.

Resistance to a strong oxidizing agent was determined by immersing tensile specimens of each compound in red fuming nitric acid for six hours. The changes in the physical properties of the stocks are shown in Table IV. Of the three types of curing agents used the peroxide retained highest tensile strength. In all three cures at least 50% of the original tensile strength is retained after six hours in red fuming nitric acid while other types of rubber deteriorate completely.

High Temperature Properties

Samples of each elastomer with each curing system were conditioned at high temperatures both in air and in various fluids. The samples were hung inside 38 x 300 millimeter test tubes which were stoppered and fitted with glass condensing tubes. Where SAE 50 motor oil, Turbo Oil 15, or MLO 8200 oil was used, enough fluid was added to completely cover the samples. The tubes were then inserted in the cored holes of an aluminum block heater. Fluid III tubes were fitted with water-cooled reflux condensers and put into an oil bath.

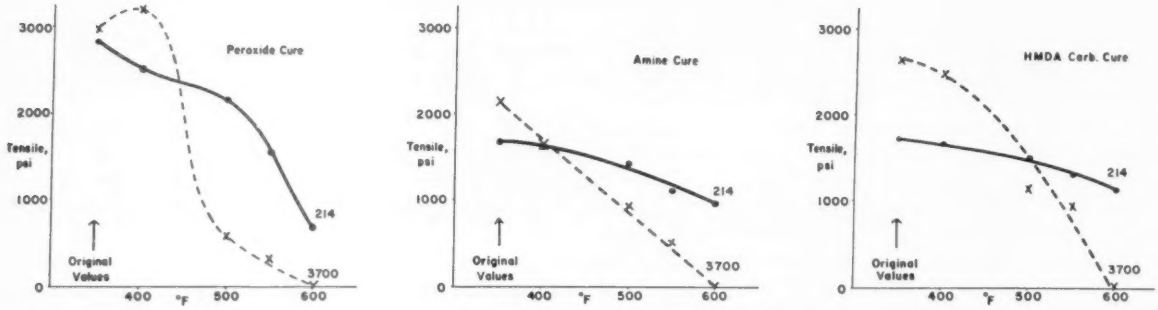


FIG. 1—Effect of type of cure on tensile strength after exposure at high temperature in air for five hours.

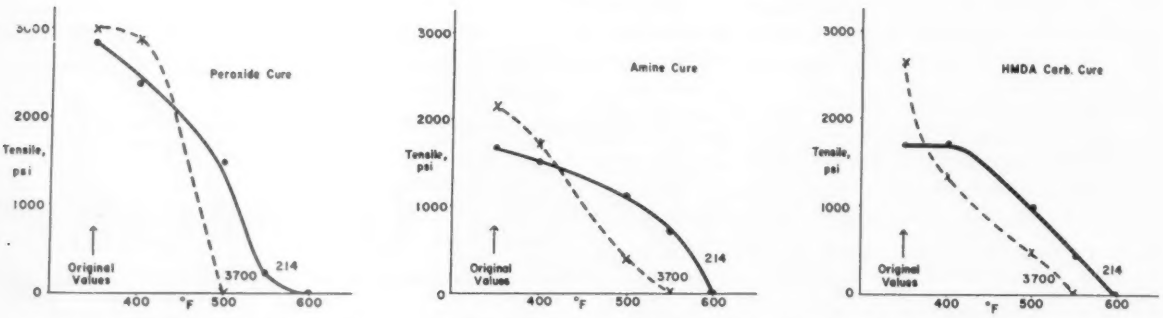


FIG. 2—Effect of type of cure on tensile strength after exposure at high temperature in air for 70 hours.

TABLE IV—PHYSICAL PROPERTIES OF FLUOROCARBON ELASTOMERS AFTER SIX HOURS IN RED FUMING NITRIC ACID AT 75±1°F.

	Peroxide Cure		Amine Cure		HMDA-Carb. Cure	
Fluorocarbon Elastomer No.	214	3700	214	3700	214	3700
Tensile Strength (psi)	1540	1780	1250	1150	1360	1450
Ultimate Elongation (%)	485	280	195	310	275	390
Stress at 300% Elongation (psi)	710	—	—	1110	—	950
Hardness, Shore A, 5 Sec. Reading	65	57	76	63	60	57

The highest temperature used with each medium was determined by the safe operating range of the medium itself. In air and in MLO 8200 oil temperatures of 400°, 500°, 550° and 600°F. were used. The Turbo Oil 15 was used at 400°F. and 500°F. and SAE 50 oil at 400°F. Samples in Fluid III were heated to 220°F., the boiling point of the liquid. Exposure times chosen were five hours and 70 hours.

Air exposed samples were tested four hours after removal from heat; liquid immersed samples 16 hours after removal from the heated liquid. Physical properties after 5 hours and 70 hours exposure in air are given in Tables V and VI.

The results show that in air Fluorocarbon Elastomer 214 is superior in heat resistance to Kel-F Elastomer 3700, which is not serviceable after five hours exposure above 550°F. in air, or above 500°F. using a peroxide cure. Fluorocarbon Elastomer 214 is serviceable after exposure up to and including 600°F. for five hour periods, regardless of curing agent. The HMDA Carbamate cure retains higher tensile strength, however.

After 70 hours exposure in air Kel-F Elastomer 3700 would not be considered serviceable beyond 500°F. Fluorocarbon Elastomer 214 would not be considered serviceable beyond 550°F. after 70 hours exposure using amine and HMDA Carbamate cures, and not serviceable beyond 500°F. using a peroxide cure. Neither elastomer is considered suitable for service after 70 hours exposure in air at 600°F., regardless of the type of curing agent used. The results are graphically shown in Figures 1 and 2.

Physical properties after 5 and 70 hours exposure in MLO 8200 fluids are given in Tables VII and VIII. Fluorocarbon Elastomer 214 is serviceable after con-

TABLE V—PHYSICAL PROPERTIES OF FLUOROCARBON ELASTOMERS AFTER FIVE HOURS IN AIR AT VARIOUS TEMPERATURES

	Peroxide Cure		Amine Cure		HMDA-Carb. Cure	
Fluorocarbon Elastomer No.	214	3700	214	3700	214	3700
400°F.						
Tensile Strength (psi)	2500	3200	1620	1640	1660	2480
Ultimate Elongation (%)	520	310	170	410	255	520
Stress at 300% Elongation (psi)	1020	1900	—	1750	—	1440
Hardness, Shore A, 5 Sec. Reading	65	60	81	72	65	64
500°F.						
Tensile Strength (psi)	2170	570	1430	930	1480	1150
Ultimate Elongation (%)	550	340	200	355	300	385
Stress at 300% Elongation (psi)	1010	560	—	920	1380	950
Hardness, Shore A, 5 Sec. Reading	64	65	78	74	65	67
550°F.						
Tensile Strength (psi)	1550	310	1110	500	1310	950
Ultimate Elongation (%)	705	105	125	130	325	235
Stress at 300% Elongation (psi)	760	—	—	—	1080	—
Hardness, Shore A, 5 Sec. Reading	64	65	75	72	65	69
600°F.						
Tensile Strength (psi)	690	Blistered, charred	960	Broke on bending	1120	Broke on bending
Ultimate Elongation (%)	795		190		345	
Stress at 300% Elongation (psi)	490	—	—	—	1030	—
Hardness, Shore A, 5 Sec. Reading	65	100+	77	97	63	88

TABLE VI—PHYSICAL PROPERTIES OF FLUOROCARBON ELASTOMERS AFTER SEVENTY HOURS IN AIR AT VARIOUS TEMPERATURES

	Peroxide Cure		Amine Cure		HMDA-Carb. Cure	
Fluorocarbon Elastomer No.	214	3700	214	3700	214	3700
400°F.						
Tensile Strength (psi)	2350	2870	1500	960	1700	1320
Ultimate Elongation (%)	475	435	190	355	310	540
Stress at 300% Elongation (psi)	1310	1730	—	1110	1630	1150
Hardness, Shore A, 5 Sec. Reading	64	64	81	75	66	67
500°F.						
Tensile Strength (psi)	1470	—	1110	380	1000	480
Ultimate Elongation (%)	715	Charred	190	75	395	40
Stress at 300% Elongation (psi)	730	—	—	—	820	—
Hardness, Shore A, 5 Sec. Reading	63	100+	77	81	64	81
550°F.						
Tensile Strengh (psi)	210	—	690			
Ultimate Elongation (%)	750	—	80	Broke on bending	440	Broke on bending
Stress at 300% Elongation (psi)	140	—	—		145	
Hardness, Shore A, 5 Sec. Reading	56	—	86	100+	71	100+
600°F.						
Tensile Strength (psi)		—		—		—
Ultimate Elongation (%)	Charred, cracked	—	Broke on bending	—	Broke on bending	—
Stress at 300% Elongation (psi)		—		—		—
Hardness, Shore A, 5 Sec. Reading		—		—		—

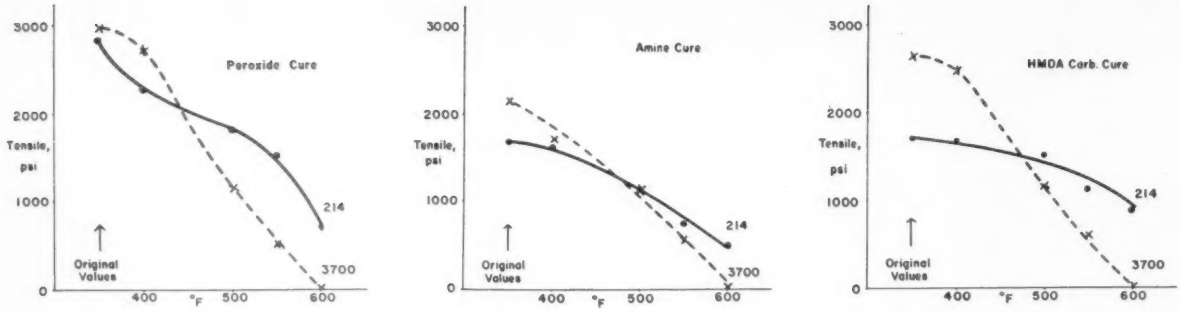


FIG. 3—Effect of type of cure on tensile strength after exposure at high temperature in MLO 8200 for five hours.

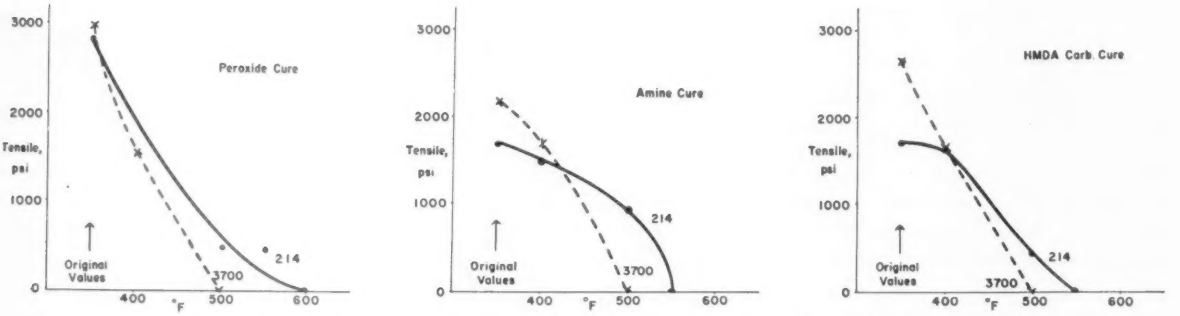


FIG. 4—Effect of type of cure on tensile strength after exposure at high temperature in MLO 8200 for 70 hours.

TABLE VII—PHYSICAL PROPERTIES OF FLUOROCARBON ELASTOMERS AFTER FIVE HOURS IN MLO 8200 AT VARIOUS TEMPERATURES

Fluorocarbon Elastomer No.	Peroxide Cure 214	Peroxide Cure 3700	Amine Cure 214	Amine Cure 3700	HMDA Carb. Cure 214	HMDA Carb. Cure 3700
Tensile Strength (psi)	2260	2720	1610	1710	1690	2490
Ultimate Elongation (%)	585	315	175	355	220	495
Stress at 300% Elongation (psi)	790	1640	—	1700	—	1490
Hardness, Shore A, 5 Sec. Reading	64	62	79	72	65	64
400°F.						
Tensile Strength (psi)	1830	1140	1120	1130	1510	1160
Ultimate Elongation (%)	715	210	260	225	285	260
Stress at 300% Elongation (psi)	560	—	—	—	—	—
Hardness, Shore A, 5 Sec. Reading	63	62	78	69	63	65
500°F.						
Tensile Strength (psi)	1520	520	740	550	1110	600
Ultimate Elongation (%)	860	45	215	25	310	100
Stress at 300% Elongation (psi)	470	—	—	—	1080	—
Hardness, Shore A, 5 Sec. Reading	63	75	75	79	65	73
550°F.						
Tensile Strength (psi)	690	Broke on bending	500 —	Broke on bending	870 —	Broke on bending
Ultimate Elongation (%)	1175					
Stress at 300% Elongation (psi)	360					
Hardness, Shore A, 5 Sec. Reading	62	85	80	100+	64	87

TABLE VIII—PHYSICAL PROPERTIES OF FLUOROCARBON ELASTOMERS AFTER SEVENTY HOURS IN MLO 8200 AT VARIOUS TEMPERATURES

Fluorocarbon Elastomer No.	Peroxide Cure 214	Peroxide Cure 3700	Amine Cure 214	Amine Cure 3700	HMDA Carb. Cure 214	HMDA Carb. Cure 3700
Tensile Strength (psi)	1900	1540	1470	1670	1630	1660
Ultimate Elongation (%)	610	140	180	205	270	260
Stress at 300% Elongation (psi)	740	—	—	—	—	—
Hardness, Shore A, 5 Sec. Reading	62	65	79	76	66	66
400°F.						
Tensile Strength (psi)	490	920	Brittle	440		
Ultimate Elongation (%)	130	30	—	25		
Stress at 300% Elongation (psi)	—	—	—	—		
Hardness, Shore A, 5 Sec. Reading	55	70	100+	65		
500°F.						
Tensile Strength (psi)	470	—	Broke on bending	—	Oil charred, samples brittle	—
Ultimate Elongation (%)	30	—		—		—
Stress at 300% Elongation (psi)	Oil charred	—		—		—
Hardness, Shore A, 5 Sec. Reading	77	—	100+	—		
600°F.						
Tensile Strength (psi)	Samples and oil charred	—	—	—	—	—
Ultimate Elongation (%)		—	—	—	—	—
Stress at 300% Elongation (psi)		—	—	—	—	—
Hardness, Shore A 5 Sec. Reading		—	—	—	—	—

tact with this liquid for five hours at 600°F. and after 70 hours at 500°F. The peroxide cured samples of Fluorocarbon Elastomer 214 retained 470 psi tensile strength after 70 hours at 550°F., but they were hardened and showed surface crazing when elongated. The Kel-F Elastomer 3700, on the other hand, is serviceable after 5 hours at 550°F. and after 70 hours at 400°F. The results are graphically shown in Figures 3 and 4.

Physical properties after 5 and 70 hours exposure in Turbo Oil 15 are given in Table IX. In this fluid the Fluorocarbon Elastomer 214 is a great deal superior to Kel-F Elastomer 3700. This is supported by the per cent volume increase at room temperature of the two elastomers in this diester oil, previously noted and listed in Table III. The Fluorocarbon Elastomer 214 in all cures is serviceable after 70 hours at 500°F. in contact with Turbo Oil 15. The Kel-F Elastomer 3700 is serviceable only after five hours at 400°F. in contact with this fluid, except the peroxide cured sample which may possibly be serviceable after 70 hours at 400°F. The results are graphically shown in Figures 5 and 6.

Physical properties after 5 hours and 70 hours exposure in Fluid III are given in Table X, and after the same exposures in SAE 50 motor oil in Table XI. Both elastomers are serviceable after contact with these liquids at the test temperature used.

TABLE IX—PHYSICAL PROPERTIES OF FLUOROCARBON ELASTOMERS AFTER FIVE AND SEVENTY HOURS IN TURBO OIL 15 AT 400 AND 500°F.

	Peroxide Cure		Amine Cure		HMDA-Carb. Cure	
Fluorocarbon Elastomer No.	214	3700	214	3700	214	3700
After Five Hours Exposure at 400°F.						
Tensile Strength (psi)	2830	1000	1360	400	1670	540
Ultimate Elongation (%)	675	245	235	365	315	385
Stress at 300% Elongation (psi)	520	—	—	430	1540	490
Hardness, Shore A, 5 Sec. Reading	56	36	73	41	60	38
After Five Hours Exposure at 500°F.						
Tensile Strength (psi)	1870	430	500	70	1400	80
Ultimate Elongation (%)	790	380	620	635	440	585
Stress at 300% Elongation (psi)	380	300	690	80	900	70
Hardness, Shore A, 5 Sec. Reading	50	18	67	15	58	14
After 70 Hours Exposure at 400°F.						
Tensile Strength (psi)	2290	680	1090	120	1770	160
Ultimate Elongation (%)	745	240	315	455	325	500
Stress at 300% Elongation (psi)	470	—	1120	150	1550	160
Hardness, Shore A, 5 Sec. Reading	53	28	74	14	59	14
After 70 Hours Exposure at 500°F.						
Tensile Strength (psi)	960	Samples disintegrated	580	20	630	Samples disintegrated
Ultimate Elongation (%)	1110		20	10	75	
Stress at 300% Elongation (psi)	350		—	—	—	
Hardness, Shore A, 5 Sec. Reading	55		80	0	62	

TABLE X—PHYSICAL PROPERTIES OF FLUOROCARBON ELASTOMERS AFTER FIVE AND SEVENTY HOURS IN FLUID III AT 220°F.

	Peroxide Cure		Amine Cure		HMDA-Carb. Cure	
Fluorocarbon Elastomer No.	214	3700	214	3700	214	3700
After Five Hours Exposure						
Tensile Strength (psi)	2190	1540	1170	780	1190	1060
Ultimate Elongation (%)	550	260	215	260	205	360
Stress at 300% Elongation (psi)	680	—	—	—	—	900
Hardness, Shore A, 5 Sec. Reading	57	54	69	57	58	54
After 70 Hours Exposure						
Tensile Strength (psi)	1810	1500	1130	680	1110	1130
Ultimate Elongation (%)	515	225	205	195	200	385
Stress at 300% Elongation (psi)	650	—	—	—	—	880
Hardness, Shore A, 5 Sec. Reading	58	54	68	55	59	55

TABLE XI—PHYSICAL PROPERTIES OF FLUOROCARBON ELASTOMERS AFTER FIVE AND SEVENTY HOURS IN SAE 50 MOTOR OIL AT 400°F.

	Peroxide Cure		Amine Cure		HMDA-Carb. Cure	
Fluorocarbon Elastomer No.	214	3700	214	3700	214	3700
After Five Hours Exposure						
Tensile Strength (psi)	1920	2930	1670	1730	1740	2450
Ultimate Elongation (%)	480	280	175	385	270	455
Stress at 300% Elongation (psi)	940	—	—	1730	—	1630
Hardness, Shore A, 5 Sec. Reading	65	65	80	71	65	64
After 70 Hours Exposure						
Tensile Strength (psi)	2190	2150	1550	1970	1690	2070
Ultimate Elongation (%)	435	215	165	280	225	280
Stress at 300% Elongation (psi)	1350	—	—	—	—	—
Hardness, Shore A, 5 Sec. Reading	64	64	81	76	64	66

TABLE XII—LOW TEMPERATURE PROPERTIES OF FLUOROCARBON ELASTOMERS

	Peroxide Cure		Amine Cure		HMDA-Carb. Cure	
Fluorocarbon Elastomer No.	214	3700	214	3700	214	3700
Gehman Relative Torsional Modulus						
°F. T2	+20	+16	+23	+14	+22	+15
T5	+13	+ 6	+14	+ 8	+16	+ 7
T10	+11	+ 4	+10	+ 4	+13	+ 4
T100	0	— 9	— 2	—11	+ 4	— 9
Temperature Retraction Test						
°F. TR10	+ 4	+ 1	+ 5	+ 3	+ 3	+ 3
TR30	+10	+11	+12	+21	+29	+21
TR50	+14	+21	+18	+34	+13	+33
TR70	+18	+30	+23	+48	+18	+44
Brittle Point °F.	—17	—44	+ 3	—45	—33	—60

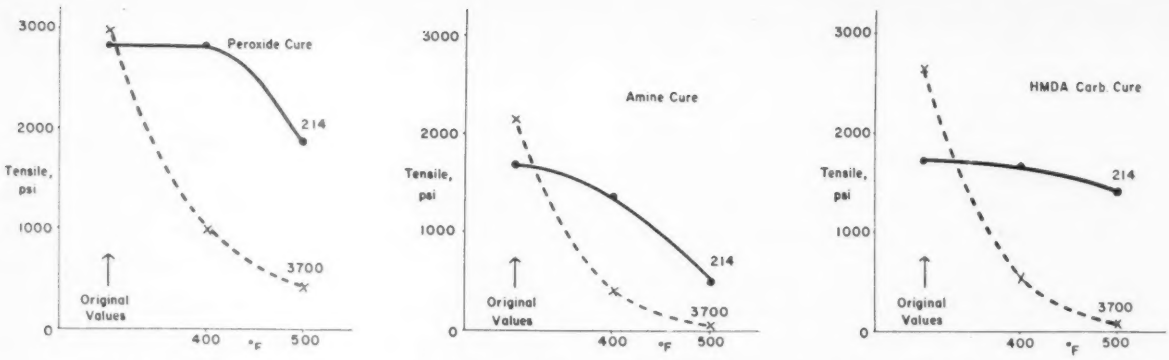


FIG. 5—Effect of type of cure on tensile strength after exposure at high temperature in Turbo Oil 15 for five hours.

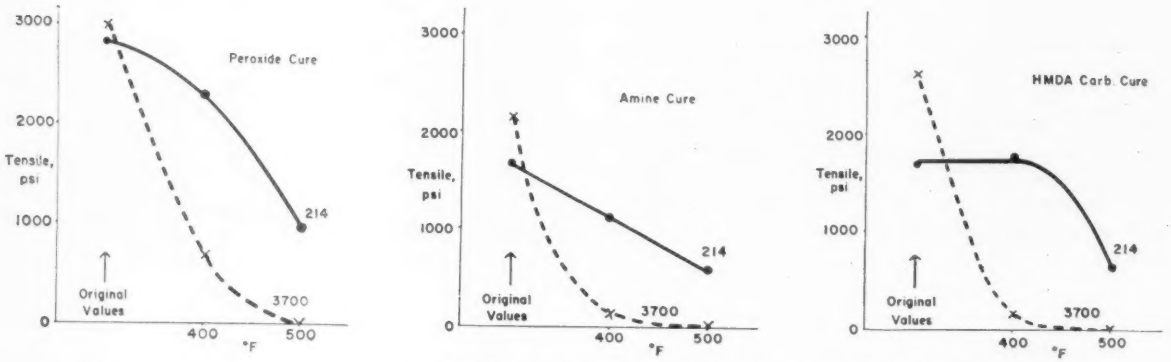


FIG. 6—Effect of type of cure on tensile strength after exposure at high temperature in Turbo Oil 15 for 70 hours.

In all media the elastomers darkened when exposed to heat, becoming progressively darker as the temperature was raised. Examining the data contained in the tables it can be seen that in some cases the stress at 300% elongation equals or exceeds the tensile at break. On the stress-strain curves this appeared as a gradual drop in stress before break and gave indication of plastic behavior. This effect was noted for the most part with Kel-F Elastomer 3700, and mainly when cured with the amine.

The low temperature properties of Kel-F Elastomer 3700 are poor. To determine possible superiority of Fluorocarbon Elastomer 214, various low temperature tests were run. Results of these tests are listed in Table XII.

The Gehman stiffness test indicates a slight superiority in low temperature flexibility for Kel-F Elastomer 3700. The temperature retraction test on the other hand shows a slight superiority for Fluorocarbon 214. The type of cure had no effect on Gehman values, little effect on temperature retraction and then only on Kel-F Elastomer 3700 stocks. Brittle points varied between the three curing systems and to an appreciable extent. In general, however, both elastomers are usable to +10°F.

Summary

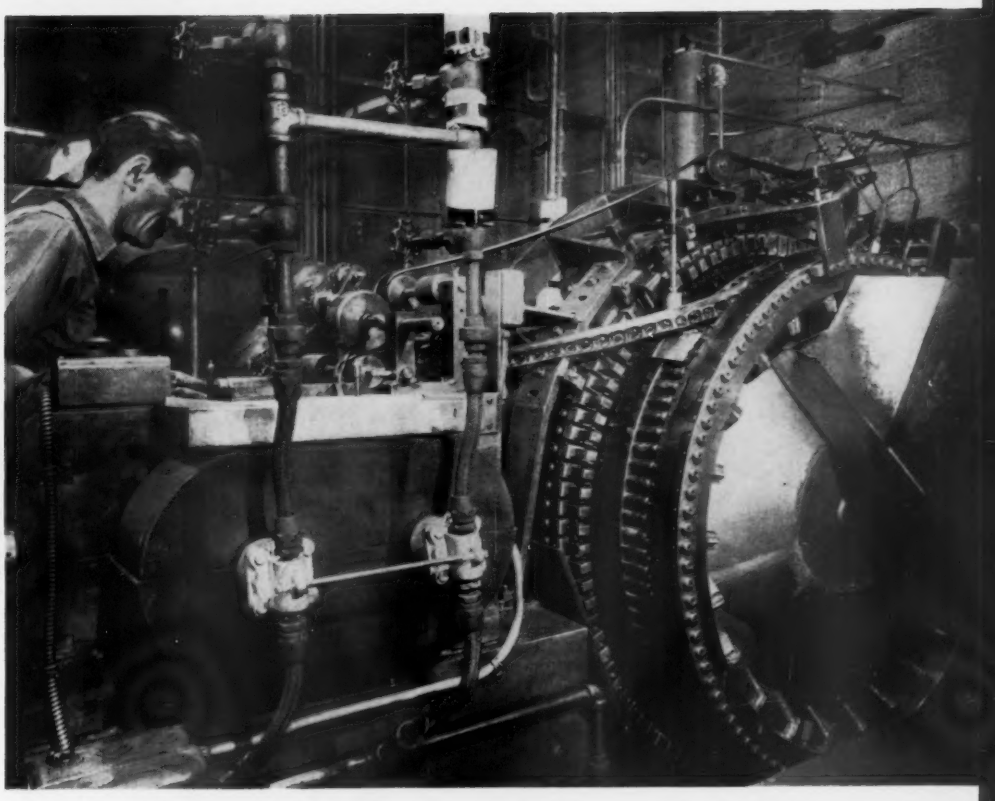
Kel-F Elastomer 3700 and a recently developed material, designated as Fluorocarbon Elastomer 214, were cured using a peroxide, an amine, and a new curing agent, HMDA Carbamate. The cured materials were exposed for periods of 5 hours and 70 hours to SAE 50 motor oil, diester fluid Turbo Oil 15, silicate ester oil MLO 8200, Fluid III and air at temperatures up to 600°F. depending on the medium used. Volume swell measurements were made at room temperature in each of the liquids. Tests were also performed on the elastomers after exposure to red fuming nitric acid at room temperature.

Fluorocarbon Elastomer 214 is superior to Kel-F Elastomer 3700 after exposure in air, Turbo Oil 15, MLO 8200 and Fluid III at high temperatures. In SAE 50 motor oil the two elastomers are similar with amine and carbamate cures, but Kel-F Elastomer 3700 is superior with the peroxide cure. The two polymers have good resistance to red fuming nitric acid at room temperature.

Neither elastomer is serviceable after 70 hours at 600°F. either in air or MLO 8200, the only oil carried to that temperature. However, after 5 hours at 600°F. Fluorocarbon Elastomer 214 is serviceable after exposure both to air or to MLO 8200.

None of the curing agents showed superiority under all conditions. Choice as to best curing agent would be determined by the conditions under which the elastomer is to be used.

Low temperature properties, which were also tested, indicated that both elastomers have poor low temperature flexibility and that they are not suitable for use below +10°F.



Close-up of a continuous automatic rubber molding machine showing the plasticizing mill at left and rotary molding section at right. A ribbon of compound is seen traveling to molds across the top of the photo, and returning across the center. Molds open at upper right, dropping pieces into a chute which leads to a conveyor.

Automatic Custom Molding of Rubber Parts

A COMPLETELY automated process for high precision, high volume custom molding of rubber parts has been placed into full operation at Stratford, Conn., by the Ohio Rubber Co. Because of the high degree of mechanization, the process is said to make possible the production of close-tolerance parts without the premium price normally associated with precision rubber molding.

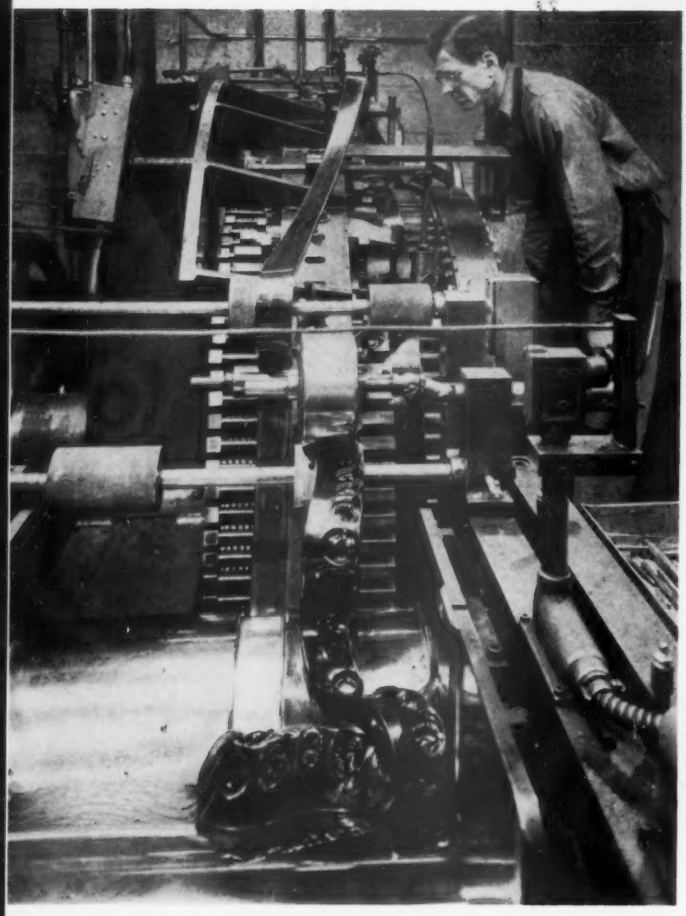
For parts requiring a maximum of dimensional accuracy, the new process offers a degree of accuracy not economically obtainable by any other rubber-forming method, according to information released by Ohio Rubber. For parts which require tolerances obtainable by other precision molding methods, the new process offers cost reductions. For many parts now being produced by conventional molding, the new process will make possible improved performance resulting from greater dimensional accuracy, without prohibitive increase in cost. For parts used in automated assembly operations, the new process provides the necessary uniformity and does so without the usual high premium price.

The equipment used in the new Ohio Rubber continuous molding process requires an operator only to keep the machine supplied with compounded stock, and to remove containers of finished parts. The automatic and continuous nature of the process makes possible production rates as high as 200,000 pieces per day from single-cavity self-registering molds. While utilization of such molds has always been recognized as the key to precision, their use has been too costly due to the low production rate per machine-hour which would result. The new process, by automation, raises the productive capacity to the required level to make single-cavity mold use economically feasible.

Because of the continuous nature of the operation, time and temperature are precisely controlled throughout the molding-curing cycle. The single-cavity molds provide for accurate application of pressure—resulting in uniform flash, permitting greater precision and reduced finishing costs.

The process is best suited to relatively small parts, required in large quantities, which are functional and therefore require a significant degree of dimensional accuracy and quality of material. Parts already in production include seals for automotive shock absorbers and universal joints, washers for water conditioner quick-connectors, end caps for electric condensers, aerosol container valve parts, engine valve stem deflectors and fastener components.

Mold halves are periodically subjected to careful inspection under magnifying glasses, then mounted in chuck for cleaning. As a mold half is rotated, an operator holds a tool dipped in fine abrasive against it.



A continuous automatic molding machine with plasticizing mill in foreground and rotary molding section in the background. Rotary knives (not visible) cut a ribbon of compound from the rear roll of the mill. The ribbon is fed up and back over the rollers and guided down between mold halves at a point where they close (directly in front of the operator). Net, which is the ribbon of compound after molds have punched out stock from it, returns from right center over rollers to mill (foreground).

High Accuracy Achieved

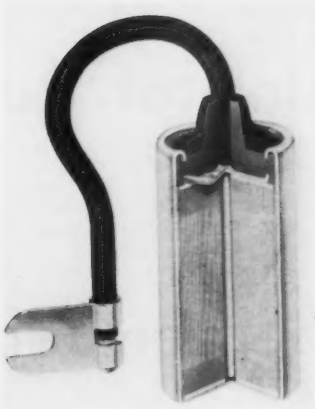
Accuracy equal to or better than that obtainable by any other rubber-forming method is said to be routine with the new automatic continuous process. In general, diameters can be accurate within plus or minus 0.003 to 0.005-inch, depending on size. A critical dimension on one part now in production is being held within plus or minus 0.0025-inch. On another part with a thin section and relatively large diameter, surfaces are produced parallel within 0.003-inch. Accuracy is substantially the same for fixed or closure dimensions, because flash is so precisely controlled.

Annual production of a million or more pieces will normally be required to justify the tooling cost and set-up of the new process. With present equipment, approximate maximum part dimensions with full tooling are 1¼ inches diameter and one inch thickness. Actual limits depend on shape, total mass of the part, and type of material. Reducing the number of molds mounted on the machine permits larger parts to be produced, but lowers the production rate. The process can be used to mold natural and synthetic rubber compounds.

The new process, based on methods and equipment originated by the Gora-Lee Corp., was originally limited to high-durometer compounds, and was applied exclusively to a few small proprietary parts. The Ohio Rubber Co. development of the process followed taking a license from Gora-Lee and subsequent purchase of the Gora-Lee Corp. This development has brought about the present versatility of the process, which can now be used for custom molding of a wide variety of parts, from materials with a wide range of physical properties, embracing a durometer hardness range from 45 to 95.

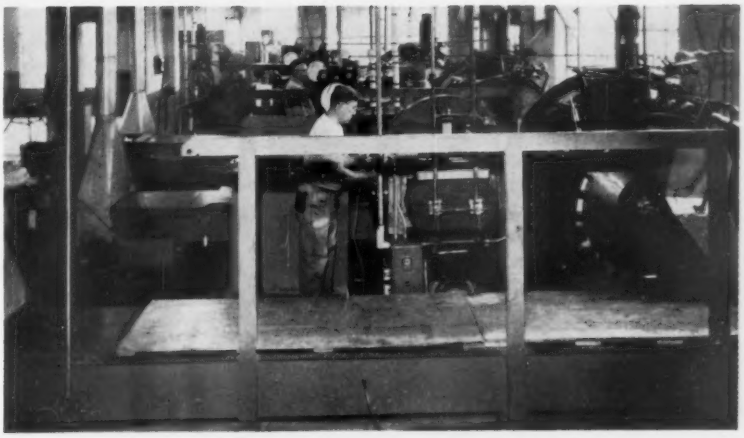
Each machine consists of a two-roll plasticizing mill integrated with rotating molding equipment. The molding section consists of two vertical 48-inch wheels on a common axle, spaced several inches apart. The outboard wheel normally mounts the mold cavities, and the inboard wheel holds the force plugs. In this set-up, the female mold cavities are fixed and the force plugs are movable. The force plugs are mounted on trunnions extending through the inboard wheel, actuated by spring-

Discharge end of a conveyor, with a molding machine in the background. About 90 per cent of cure occurs in the mold, and the heated conveyor completes cure before discharging the pieces.



Application of a rubber cap molded by the automatic process in a waterproof electrical condenser.

Over-all view of the molding machine area. The machines are at the right, and discharge ends of conveyors at the left. The wire (foreground) leads from the conveyor tunnel to a precision temperature control device.



loaded toggles. In effect, each unit is an individual mechanical press with a self-registering, single-cavity mold. With full tooling, there are 104 single-cavity molds on each machine.

Each mold goes through a complete molding cycle during each revolution of the wheel. Opening, closing, and "bumping" of the molds is controlled by a stationary cam, on which the follower of each mold toggle rides. While the cam accurately controls the timing of each of these operations in the cycle, the molds close and are held by toggle action against precisely-set spring pressure.

In the usual method of feeding, the two-roll plasticizing mill is periodically supplied by the operator with compounded stock; all other operations are continuous and automatic. Rotary knives cut from the mill a continuous ribbon of material which is fed over a closed loop of rollers through the machine and back to the mill. At the point on the rotating wheels at which molds close, the ribbon is fed between the open mold halves. Each mold cuts the amount of material it needs from the ribbon as it closes.

The plant at Stratford, Conn., at present has ten of the 48-inch machines, plus several smaller machines of more limited capability. Production rate of each of the 48-inch machines normally ranges from 40,000 to 200,000 per day with full tooling. Under certain special circumstances, production rates can be much higher. Production rate depends upon the size and shape of the part and the type of material. In general, however, the production rate is determined by the required curing time.

Many low-grade compounds used in low-cost molded parts require long curing time, so that the machines would have to be slowed to accommodate them. Since the low cost of automatic production results from high machine output, this reduction might make the process uneconomical for parts made from such materials. In the case of many such inexpensive parts, however, Ohio Rubber says that its compounding experts will be able to develop alternate compounds which can be molded at high production rates and which at the same time will be low enough in cost so that the desired over-all savings will result.

Division of Rubber Chemistry, A. C. S., Meets in Chicago September 10 through 12

THE 74th meeting of the Division of Rubber Chemistry of the American Chemical Society will be held at the Hotel Sherman, Chicago, Illinois, on September 10 through 12 in conjunction with a meeting of the parent society. The three-day meeting will feature the presentation of 31 technical papers and the 1958 Charles Goodyear Lecture. Other activities of interest will include a luncheon-meeting of the Twenty-Five Year Club, a business meeting and a divisional banquet.

The technical program for the meeting has been divided into four sessions, each with its own theme. Additional papers on topics outside the specified areas of interest will also be presented at each session. On Wednesday afternoon, September 10, the papers will be on "Analytical Methods, Pigments and Properties." R. F. Dunbrook, Firestone Tire & Rubber Co., Division Chairman, will preside.

The meeting on Thursday morning, September 11, will be devoted to papers on "Vulcanization and Deterioration." E. H. Krismann, E. I. du Pont de Nemours & Co., Inc., Division Vice-Chairman, will serve as chairman. The Thursday afternoon session, under the direction of S. C. Nicol, Goodyear Tire & Rubber Co., will feature papers on "High Temperature Resistance." The last session, on "New Elastomers and Adhesives," will be held on Friday morning, September 12. A. E. Laurence, Phillips Chemical Co., will preside.

The business meeting will be held at 11:05 a.m., Thursday, September 11. This will be followed by the Charles Goodyear Medal Lecture, "Comments on Polysulfide Elastomers," by Dr. J. C. Patrick, Thiokol Chemical Corp.

The ladies who are present have been invited to participate in the ladies' activities arranged by the parent society. All are asked to attend a suppliers' cocktail party in the Main Ballroom of the Hotel Sherman on Thursday before the division banquet, which will be held at the same place at 6:45 p.m. Banquet tickets may be ordered in advance.

Mr. Laurence, who is serving as General Chairman of the Local Arrangements Committee, will be assisted by V. J. LaBrecque, Victor Manufacturing & Gasket Co. as General Vice Chairman. Committee chairmen are: *Finance,* S. F. Choate (Tumpeer Chemical); *Printing,* L. W. Heide (United States Rubber); *Banquet,* J. P. Sheridan (New Jersey Zinc) and R. R. Kann (Goodyear); *Program and Meeting Rooms,* H. D. Shetler (Chicago Rawhide Manufacturing); *Housing,* J. Groot (Dryden Rubber); *Registration,* Robert Varick (Fred A. Jensen); *Ladies' Entertainment,* J. E. Stonis (C. P. Hall); *Transportation,* H. E. Minnerly, Jr. (Goodrich); *Publicity,* M. J. O'Connor (O'Connor & Co.); *Information,* F. P. Steitz (J. M. Huber). Charles M. Baldwin, United Carbon Co., will act at chairman of the luncheon-meeting of the Twenty-Five Year Club.

Abstracts of the technical papers to be presented at the meeting follow herewith.

Program of the
DIVISION OF RUBBER CHEMISTRY
AMERICAN CHEMICAL SOCIETY
Hotel Sherman, Chicago, Illinois
September 10-12, 1958

Wednesday Morning—September 10

9:00 A.M.—Registration.
11:30 A.M.—Twenty-Five Year Club Luncheon (C. M. Baldwin, United Carbon Co., Chairman).

Wednesday Afternoon—September 10

2:00 P.M.—Introductory remarks by R. F. Dunbrook, Division Chairman.
2:05 P.M.—Technical Papers—"Analytical Methods, Pigments and Properties."

Thursday Morning—September 11

9:00 A.M.—Technical Papers—"Vulcanization and Deterioration."
11:05 A.M.—Business Meeting.
11:15 A.M.—Charles Goodyear Medal Lecture: "Comments on Polysulfide Elastomers," by J. C. Patrick, Thiokol Chemical Corp.

Thursday Afternoon—September 11

2:00 P.M.—Technical Papers—"High Temperature Resistance."

Thursday Evening—September 11

6:00 P.M.—Suppliers' Cocktail Party.
6:45 P.M.—Division Banquet.

Friday Morning—September 12

9:00 A.M.—Technical Papers—"New Elastomers and Adhesives."

Wednesday Afternoon—September 10

Analytical Methods, Pigments and Properties

R. F. Dunbrook, Presiding

2:00 P.M.—1—Introductory remarks.

2:05 P.M.—2—The Determination of Zinc Oxide in Rubber Vulcanizates by X-Ray Diffraction. ***M. P. Wagner, S. H. Laning and J. W. Sellers (Research Laboratories, Columbia-Southern Chemical Corp., Barberton, Ohio). (Paper will be presented by Mr. Wagner).***

The need for a rapid, non-destructive analysis for zinc oxide in rubber vulcanizates prompted the consideration of the X-ray techniques. Diffraction patterns from the surface of the sample were found to give reliable correlation with the concentration of zinc oxide in the sample. The experimental procedure and treatment of the data will be discussed. Application of this technique to some typical filled sulfur rubber vulcanizates indicated that, while zinc oxide is necessary for the production of cross-links, consumption of zinc oxide is independent of the amount and type of reinforcing filler.

2:25 P.M.—3—Semi-Micro Determination of Free Sulfur in Cured Rubber Stocks. ***Roger W. Strassburg (General Chemical Laboratories, B. F. Goodrich Co., Akron, Ohio).***

Our method of finding the state of cure of a vulcanized rubber sample is based on a determination of the free sulfur content. Since dissection of rubber products often requires that very small samples be analyzed, the method can be utilized on amounts of material between 15 and 50 mg. Free sulfur in the sample is allowed to react with sodium sulfite to produce sodium thio-sulfate which is then titrated with standard iodine solution after removal of excess sulfite. The accelerator tetramethylthiuram disulfide interferes with this analysis and the method is not applicable if it is present.

Sample preparation was found to exert considerable influence on the accuracy and precision of the analysis. Accuracy depends on the extent of subdivision of the sample because the the extraction with sodium sulfite will be less complete for larger pieces of rubber. Precision depends on the uniformity both of sample subdivision and sulfur content. A comparison between samples sheeted on a standard rubber mill and granulated to uniform size in a semi-micro Wiley mill after freezing with solid carbon dioxide shows improvement in both accuracy and precision by the latter method. Processing the rubber without treatment with solid carbon dioxide causes much difficulty in handling and the loss of free sulfur by further vulcanization during the resultant frictional heating. A study of sample subdivision indicates there is an optimum mesh size which provides for both ease of handling in the analytical procedure and completeness of extraction.

Techniques which allow the free sulfur content of a part of a tire to be determined without destroying the tire will be illustrated. The simplicity and speed of the semi-micro free sulfur method will be demonstrated in a 16 mm. movie of the actual operation.

2:45 P.M.—4—The Determination of Free Sulfur in Accelerators. ***R. A. Hively and C. W. Wadelin (Research Division, Goodyear Tire & Rubber Co., Akron, Ohio). (Paper will be presented by Mr. Wadelin).***

Several methods have been proposed for the determination of free sulfur in accelerators. Some of the methods can be applied in certain specific cases, but no general procedure is available for accelerators except, possibly, the isotope dilution method of Ikeda and Kambara. With this method it would be necessary to isolate the sulfur or a derivative in pure form, weigh the amount isolated, and measure its specific radioactivity. Mercaptans interfere in determinations based on the reaction of alkali cyanide with sulfur. A polarographic procedure is sensitive and accurate, but miscellaneous sulfides, disulfides, sulfenamides, etc., have reduction waves that interfere with the estimation.

This paper proposed a preliminary chromatographic separation of accelerators which interfere with the polarographic determination of sulfur. Accelerators are retained on an alumina column from benzene solutions but free sulfur passes through. The polarographic method of Poulton and Tarrant is used to measure the sulfur by means of the wave whose half wave potential is —0.6 volt versus the saturated calomel electrode. Either a recording or manual polarograph can be used as only a single current measurement is required for each sample. From 0.02 to 3.6% of free sulfur can be determined in 2-mercaptobenzothiazole, benzothiazyl disulfide, thiuram disulfides, dithiocarbamates, or sulfenamides. Approximately one hour is required for the determination.

3:05 P.M.—5—Accelerated Testing of Ozone Cracking Inhibitors. ***F. B. Smith and W. F. Tuley (Development Department, Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.). (Paper will be presented by Mr. Smith).***

In the research program at Naugatuck Chemical both accelerated and unaccelerated tests are used to screen and select commercial ozone cracking inhibitors. Typical data from this work are shown, indicating the relative effectiveness of several commercial chemical antiozonants in tread and sidewall compounds. The proper use of waxes with these antiozonants is also illustrated.

It is demonstrated that the accelerated test may produce misleading results unless employed in conjunction with other more definitive tests. This variation may be explained in these terms: Over-saturation of the rubber surface with ozone largely decreases the concentration of protective antiozonant in the rubber surface and ozone cracking occurs. Rate of renewal of antiozonant in the surface from the underlying layers is insufficient to rectify the initial loss in concentration. Under atmospheric conditions the concentration of ozone is generally much lower and such marked decrease in the antiozonant concentration is not likely to occur.

In terms of actual product performance (i.e., tires) the most informative tests are shown to be the outdoor dynamic cracking test and the outdoor wheel test. These tests show that N-phenyl-N′ cyclo-hexyl p-phenylene diamine produces substantially greater inhibition of ozone cracking than other commercial chemical antiozonants.

3:30 P.M.—6—The Formation of Volatile Fatty Acids in Ammonia-Preserved Natural Latex Concentrates. ***J. S. Lowe (Dunlop Research Center, Dunlop Malayan Estates Limited, Malacca, Malaya) and J. A. Carr (Dunlop Research Center, Toronto, Canada). (Paper will be presented by Mr. Carr).***

Measurement of volatile fatty acids present in ammonia-preserved natural latex is of importance in judging the degree of preservation of such latex. It is comparatively easy to produce a latex of low VFA content but it is another matter to ensure that the latex reaches the consumer with a VFA of low level or even of constant level from shipment to shipment.

The formation of volatile fatty acids in ammonia-preserved natural latex concentrate has been studied and the results show that the following factors contribute to their formation: (a) The quality of the field latex, the level of bacteria population in the latex and the length of time they have been allowed to remain viable in the latex; (b) The amount of serum substrate available for the enzymic process; (c) The degree of inhibition exerted by the level of ammoniation; (d) The reduction-oxidation potential of the latex. Data are presented supporting these conclusions and some of the controlling factors are discussed.

3:50 P.M.—7—Important Quality Factors in Styrene-Butadiene Rubber (SBR) as Affected by Stabilizers and Flocculation Techniques. ***B. A. Hunter, A. C. Nawakowski, R. R. Barnhart, E. B. Hansen and E. M. Campbell (Development Department, Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.). (Paper will be presented by Mr. Hunter).***

Adequate stabilization of styrene rubbers demands careful consideration if maximum quality is to be obtained. Improperly stabilized styrene rubber readily undergoes heat degradation during manufacture in the polymer plant and also during hot processing operations in the subsequent manufacture of the finished product. Heat degradation is evidenced in polymer discoloration, resinification, changes in Mooney viscosity and eventual gel build-up. These effects are reflected in the processing characteristics of the raw polymer and also in the quality of the final vulcanizate. Oil-extended polymers are especially susceptible to heat degradation. The proper selection of an effective stabilizer is of particular importance in these polymers.

Commercial styrene rubber stabilizers vary considerably in their influence on the heat stability and processing characteristics of the polymer. Certain phenolic types exert a peptizing action which may promote breakdown of the polymer. The non-discoloring aryl phosphite type stabilizer is effective in preventing Mooney fluctuations and gel build-up in hot processed polymers and has wide applicability in both conventional and oil-extended types.

Data are presented which illustrate the adverse influence of excessive usage of sodium chloride as a flocculating agent. The advantages of the acid-glue flocculation technique as compared to the conventional salt-acid procedure are apparent in the improved heat stability of acid-glue flocculated polymers. Corresponding superiority in the physical properties of vulcanizates of the acid-glue polymer is evident when the uncompounded polymer is subjected to high temperature processing conditions.

The relationship between polymer instability and the presence of certain metallic ions (specifically iron) is re-emphasized in the present work.

4:10 P.M.—8—Kinetics of Filler-Polymer Interaction Between Fine Particle Silica or HAF Carbon Black and SBR or Butyl Rubber. ***Melvin P. Wagner and John W. Sellers (Research Laboratory, Columbia-Southern Chemical Corp., Barberton, Ohio). (Paper will be presented by Mr. Wagner).***

The thermal interaction of various fine particle silicas, calcium silicate, and HAF carbon black with styrene rubber or butyl rubber was examined kinetically. The reaction of fine particle silica and HAF blacks followed zero order kinetics with an activation energy sufficiently high (17 ± 3 kcal./mole) to indicate that a chemical reaction (as contrasted to purely physical adsorption) was involved. In line with its indicated chemical nature, filler-polymer interaction was found to be irreversible. Cold milling techniques revealed that fine particle silica was as good a free radical acceptor as HAF carbon black. The kinetics of the filler-polymer gel development were not altered with the use of an esterified fine particle silica.

Like graphatized channel black, calcium silicate showed no temperature coefficient of filler-polymer interaction. Modern theory suggests that reinforcement mainly is a result of chemical interactions between filler and elastomer during vulcanization. These experimental results, then, show the potential of fine particle silica to participate effectively in filler-polymer interactions equal to high efficiency reinforcing carbon blacks.

4:30 P.M.—9—The Organic Nature of Carbon Black Surfaces. II—Quinones and Hydroquinones by Coulometry at Controlled Potential. ***J. V. Hallum and H. V. Drushel (Mellon Institute of Industrial Research, University of Pittsburgh, Pittsburgh, Penna.). (Paper will be presented by Mr. Hallum).***

A quantitative method for the determination of quinone oxygen and hydroquinone hydroxyl on the surface of carbon blacks by coulometric reduction or oxidation is described. This method consists of suspending, by means of stirring, a sample of carbon black in a solution of dimethylformamide and the electrolyte. This slurry is then electrolyzed at constant potential using compartmented cells to prevent reverse reactions from occurring. The number of coulombs required for the reaction, whether oxidation or reduction, is determined by graphic integration of the current-time curve from the recorder. The compartmented cells used provided controlled hydrodynamic conditions so that the reactions proceeded at a reasonable rate with reproducible results.

The number of coulombs of electricity (Q) consumed for either oxidation or reduction is given by the equation

$$Q = (i - i_{l\,lm})\,dt,$$

where i is the current in amperes, $i_{l\,lm}$ is the limiting current in amperes and t is the time in seconds. From this, the weight per cent of quinone oxygen is calculated by means of the equation

$$\%\ \text{Quinone O} = \frac{Q(16.00)\ (100)}{n(96{,}500)\ (\text{sample weight})}$$

where n is the number of electrons transferred in the electrode reaction. Similarly, the weight per cent of hydroquinone hydroxyl is calculated as follows:

$$\%\ \text{Hydroquinone OH} = \frac{Q(17.01)\ (100)}{n(96{,}500)\ (\text{sample weight})}.$$

The control potential and n were determined on the basis of previous polarographic studies.

The results obtained were reproducible with either five or ten gram samples and varied according to the nature of the black from essentially zero to a high of 1.020% quinone oxygen and from zero to 0.344% for hydroquinone OH.

4:50 P.M.—10—The Sorption of Benzene by Natural and Synthetic Polymeric Hydrocarbons. ***Paul Fugassi and George Ostapchenko (Coal Research Laboratory, Department of Chemistry, Carnegie Institute of Technology, Pittsburgh, Penna.). (Paper will be presented by Mr. Fugassi).***

The sorption of benzene on natural and synthetic hydrocarbon polymers has been measured at 45°C. using a gravimetric method employing McBain-Baker spring balances. The sorption of benzene on these polymers is isothermally reversible. Measurements were made on the following hydrocarbon polymers: natural rubber, balata, polyisobutylene, *cis*, 1-4 polybutadiene, polyethylenes, polypropylenes and polystyrenes. Measurements have been limited to relative pressures between 0.2 and 0.9. Spring balances have relatively low precision at low relative pressures because of low sorption. At very high relative pressures corrections are necessary for the adsorption of benzene on the spring and on the glass bucket carrying the sample. Such corrections are negligible at relative pressures lower than 0.9.

Over this range of relative pressures, the experimental results have been fitted to a sorption isotherm of the form

$$\frac{C}{W_e} = \frac{1}{AK} + \frac{K-1}{AK}\,c.$$

In this equation, W_e is the equilibrium sorption in moles of benzene per gram of polymer, A is moles of internal sites per gram of polymer, K is an equilibrium constant (dimensionless) and c is the relative pressure or the pressure of benzene divided by the vapor pressure of benzene at 45°C. This equation is a special form of a more general equation derived from kinetic considerations for the sorption of polar vapors, such as water, by polar gels such as polysaccharides, proteins, and coal.

It has been found that the value of A can be calculated if the polymer has a known structure and if rotation about individual carbon-carbon bonds is free. Anything which hinders such rotation such as cross-linking or order will give lower values of A. The experimental determination of A for a given polymer sample of known structure will permit the estimation of the amount of order present in such a sample.

Thursday Morning—September 11

Vulcanization and Deterioration

E. H. Krismann, Presiding

9:00 A.M.—11—Radiation Vulcanization of Elastomers. *Dale J. Harmon (Research Center, B. F. Goodrich Co., Brecksville, Ohio).*

Radiation cure studies were made on carbon black reinforced styrene rubber, nitrile rubber, chloroprene rubber and natural rubber compounds, and optimum cures determined. Static and dynamic measurements were made as well as ozone cracking and oxidation rates and elevated temperature stress-strain and test tube aging measurements and the results were compared with those of chemical cures of the same elastomers. The effect of temperature on the curing rates as well as the effect of adding antioxidant to the radiation cured compounds was examined. A comparison was made between compounds cross-linked by exposure to gamma rays from Cobalt 60 and high speed electrons from a 2 MEV Van de Graaff Generator.

It was found that the static and dynamic properties of the radiation cures were similar to those of the chemical cures. The stress-strain properties of the radiation cures most resemble those of peroxide cures. In general, the radiation cures were found to have higher heat stability, equivalent ozone resistance and higher oxidation rates. Heat was found to accelerate the radiation cross-linking of natural rubber. The addition of an antioxidant results not only in improved heat stability but also in an improvement in initial stress-strain properties.

9:20 A.M.—12—Heat, Ozone and Gamma Radiation Stability of Highly Saturated Adduct Rubber Vulcanizates. *G. E. Meyer, F. J. Naples, and H. M. Rice (Research Division, Goodyear Tire & Rubber Co., Akron, Ohio). (Paper will be presented by Mr. Meyer).*

In further aging-stability studies on the recently described adduct elastomers (*Rubber World*, July, 1957, p. 529; August, 1957, p. 695) highly saturated (over 80%) methanethiol adducts of emulsion polybutadiene have been evaluated under more severe conditions than heretofore. These potentially low cost specialty rubbers have outstanding resistance to the degradative effects of ozone, high temperature, gamma radiation, etc.

Handling, processing and vulcanization procedures for the adducts are essentially the same as for styrene rubber. Also, as in the case of styrene rubber, curing recipes containing little or no free sulfur generally produce stocks having the best resistance to aging at elevated temperatures.

Very highly saturated adducts, containing no added antiozonant, show extraordinary ozone resistance; for example, a black loaded tread type stock exhibited no cracking upon exposure to 10,000 phm ozone for over 200 hours. Under the same conditions, Enjay Butyl 218 and Neoprene WRT cracked in less than 20 and 1 hour, respectively. Suitably vulcanized adducts appear at least equivalent to resin-cured butyl rubber in curing-bladder stocks tested under simulated production conditions.

9:40 A.M.—13—Chemical-Loaded Molecular Sieves as Latent Curing Aids. II—Accelerators for Vulcanization of Neoprene. *F. M. O'Connor and T. L. Thomas (Linde Co. Division, Union Carbide Corp., Tonawanda, N. Y.). (Paper will be presented by Mr. O'Connor).*

Neoprene formulations, like most rubber compounds, are processed at elevated temperatures. During this processing, premature vulcanization or "scorch" is a serious problem, particularly when accelerators are used to speed up the rate of cure. Ideally, the accelerator should be inactive during the various stages of processing, such as mixing and extruding, but should be available during vulcanization to promote a rapid cure. The combination of a Linde molecular sieve with compounds which are powerful accelerators for neoprene vulcanization produces such an acceleration system. These materials are unique, temperature-sensitive accelerators.

Compounds such as catechol and diethyl thiourea have been combined with molecular sieves to produce accelerators which offer very rapid cure rates while maintaining good processing safety. Considerably improved Mooney scorch times over those obtained with catechol and diethyl thiourea alone are obtained in both the W types and the G types of neoprene. These accelerators are useful in neoprene formulations containing the commonly used reinforcing fillers including carbon black, clay and natural whiting.

The combination of diethyl thiourea and molecular sieves, which gives safe-processing, rapid-curing stocks, is particularly useful when the vulcanizate requires good aging characteristics. Catechol loaded molecular sieves offer compounds which combine extra long Mooney scorch times with rapid vulcanization.

10:05 A.M.—14—Molding of Resilient Urethane Foams. *R. E. Knox (Elastomer Chemicals Department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).*

Resilient urethane foams are becoming increasingly more important as cushioning materials in the automotive and furniture fields. Articles of desired shapes and sizes can be made by molding to shape during the foaming reaction using a predetermined mold. They may also be postformed from slab foam by contour cutting or heat forming operations.

Advances in processing methods, particularly in molding, have kept pace with the marked improvements in urethane foaming systems. This paper gives a brief review of the fundamentals pertaining to the molding of solid and cored items, and discusses the more important variables involved in this operation.

The methods developed for eliminating some of the difficulties and deficiencies encountered in earlier molded articles of urethane foam, such as skin coarseness, cellular irregularity, non-uniformity of density, hard edges, surface marking, pneumaticity, and slow recovery from deformation, will be discussed. Additionally, the important economic factors that enter into any comparison of the relative merits of molded versus slab production, such as density and scrap losses, will be reviewed.

10:25 A.M.—15—Degradation of Polyisoprene Networks by Oxygen. *E. M. Bevilacqua (Research Center, United States Rubber Co., Wayne, N. J.).*

Volatile products of the oxidation (at 120°C.) of natural rubber vulcanized in two distinct ways are identical with those obtained from raw rubber. Rates of oxidation of the vulcanizates are similar, but faster than that of raw rubber. Solubility and swelling after oxidation are not affected by the nature of the cross-linking agent. Differences between the oxidation of vulcanized and raw rubber must be traced to some feature common to vulcanizates containing carbon-to-carbon and carbon-to-sulfur bonds in the cross-link, and external to the cross-link itself.

10:45 A.M.—16—Wing-Stay 100 as an Antioxidant and as an Antiozonant. *R. B. Spacht, W. S. Hollingshead and J. G. Lichty (Research Division, Goodyear Tire & Rubber Co., Akron, Ohio). (Paper will be presented by Mr. Spacht).*

The properties of Wing-Stay 100, a mixed diaryl-p-phenylenediamine, are described. This age resistor is a low melting solid which is approximately three times as soluable in rubber as diphenyl-p-phenylenediamine. This age resistor, like diphenyl-p-phenylenediamine, is especially effective in carbon black reinforced stocks. Superior resistance to oxidative degradation and flex-cracking is demonstrated by incorporation of the mixed diaryl-p-phenylenediamine in vulcanized natural rubber tread stock.

Wing-Stay 100 is an excellent stabilizer for discoloring types of polymers such as SBR-1000, 1502 and 1712. As little as 0.50 to 0.75% in raw polymers gives superior resistance to

oxidation as compared to the usual 1.25 parts of phenyl-beta-naphthylamine.

Wing-Stay 100 uniquely combines a number of the very desirable properties found in other commercially available antiozonants. Since this product is a mixture, a combination could be selected which makes this possible. For instance, this new product has low volatility. This is a decided advantage in articles which are known to operate at temperatures over 200°F. and results in a longer useful life for the antiozonant. Secondly, this mixed diaryl-p-phenylenediamine does not activate the cure, as is commonly encountered among the better antiozonants.

11:05 A.M.—Business meeting. Best paper award.

11:15 A.M.—17—Charles Goodyear Medal Award Lecture: Comments on Polysulfide Elastomers. ***J. C. Patrick (Thiokol Chemical Corp., Trenton, N. J.).***

No abstract available.

Thursday Afternoon—September 11

High Temperature Resistance

S. C. Nicol, Presiding

2:00 P.M.—18—Transition Behavior of Polychloroprene and Polychloroprene-SBR Blends. ***R. M. Kell, B. Bennett and P. B. Stickney (Battelle Memorial Institute, Columbus, Ohio). (Paper will be presented by Mr. Kell).***

The chloroprene polymers have limited application at low temperatures because of the ease with which they crystallize. In an investigation of this problem, dilatometric studies have been carried out to determine crystallization rates, melting ranges, and the effect of vulcanization for various polychloroprenes.

A typical polychloroprene (Neoprene W) was also blended with 10, 20, and 30 phr of a styrene rubber and studied over a temperature range including the glass and melting transitions. The glass transition temperature of the pure polychloroprene was lowered from —41° to —50°C. by 30 phr of SBR-1500. The added SBR-1500 retarded the rate and ultimate degree of crystallization somewhat. The maximum rate of crystallization occurred near —5°C. for pure Neoprene W, Neoprene WRT, and for blends of Neoprene Type W with SBR-1500.

Glass transition temperatures were compared with brittle point measurements in evaluating the low temperature performance of chloroprene polymers.

2:20 P.M.—19—The Dynamic Properties of Elastomers Measured Continuously with Temperature. ***A. D. Dingle and N. S. Grace (Dunlop Research Center, Toronto, Canada). (Paper will be presented by Mr. Dingle).***

A clear knowledge of dynamic properties is essential to the intelligent use of rubber compounds in dynamic service. It is well known that products subject to severe dynamic use, such as tires, rapidly heat up in service and that the rate of heating depends upon the compounds used in the tire, particularly on the choice of elastomer. It is also accepted that the dynamic properties of the materials used will change as a result of the changes in temperature during service. Hence, the dynamic properties must be determined over the anticipated operating temperature range.

The Dunlop Rotary Resilience Machine has been used to determine the dynamic properties of modulus, resilience and power loss as continuous functions of temperature. Elastomers tested have included natural rubber, styrene rubber, butyl rubber and urethane rubber; reinforcing fillers varied in both loading and type have been tested; plasticizers, extending oils and method of cross-linking (peroxide versus sulfur) have also been studied.

Curves relating the important dynamic properties with temperature over the range —40° to 200°C. will be shown. The practical importance of the results are discussed as well as the critical temperatures of resilience. The effects of frequency and amplitude on the properties are also considered.

2:45 P.M.—20—Effect of Compounding or Processing Variations on the High Temperature Properties of Hevea and Butyl Rubbers. ***F. M. Smith and W. A. Smith (Research Laboratories, Firestone Tire & Rubber Co., Akron, Ohio). (Paper will be presented by Mr. F. M. Smith).***

Curing systems believed to give predominantly monosulfide, disulfide, and tetrasulfide linkages and carbon-to-carbon linkages in Hevea compounds were evaluated with respect to high-temperature tensile properties. Blends of Hevea with balata, types and amounts of three antioxidants, and variation of major filler loading in Hevea were also investigated as a means of improving the heat resistance. No major improvement was attained by any of these means.

Improvement in the heat resistant properties of three butyl rubber cure variations was sought by dynamically heat treating butyl rubber-silica and butyl rubber-MPC black masterbatches. Highest test temperature was 500°F. The heat treatment was beneficial to the silica stocks, detrimental to the carbon black stocks.

3:10 P.M.—21—Heat Resistance of a Chlorine-Containing Copolymer of Isoolefin and Multiolefins. ***D. J. Buckley and R. E. Clayton (Chemicals Research Division, Esso Research & Engineering Co., Linden, N. J.). (Paper will be presented by Mr. Clayton).***

Modern rubber technology requires practical polymer vulcanizates which resist degradation during severe exposure to very high temperatures. This is a major consideration in the establishment of MD-551, a chlorine-containing copolymer of isoolefin and multiolefins.

This polymer has low chemical unsaturation of the order of one per cent, as desired for relative inertness to degradation. Its reactivity with respect to vulcanization is increased markedly by about 1.2% chlorine, in the highly active allylic position. The nature of the cross-link associated with the presence of chlorine contributes strongly to the heat resistance of vulcanizates of this polymer.

MD-551 is a multi-purpose rubber with respect to the various formulation and production aspects of its utility. Examples dealt with in this paper comprise specific compounding and property features of chlorobutyl that can be applied to various heat resistant applications.

[A major portion of this work was conducted under USAF Contracts Nos. AF 33(616)-3108 and AF 33(616)-3953 which were administered under the direction of the Materials Laboratory, Wright Air Development Center.]

3:35 P.M.—22—The High Temperature Properties of Elastomers Containing Carboxyl Groups. ***Robert A. Hayes (Research Laboratories, Firestone Tire & Rubber Co., Akron, Ohio).***

Outstandingly high tensile strengths and elongations at 400°F. are obtained from butadiene-methacrylic acid copolymers vulcanized with epoxy resins in conjunction with various metal oxides. In a copolymer containing 15% methacrylic acid it has been shown that the high temperature properties improve greatly with increasing metal oxide content until an equivalent amount of oxide is added. Barium and magnesium oxides produce stocks which are stiffer and stronger than those containing zinc or cadmium oxides. Reduction of the acid content of the copolymer to as little as three per cent causes a considerable increase in flexibility and elongation and only a slight decrease in

tensile strength. For example, a black-filled polymer containing only 3% methacrylic acid and vulcanized with Epon 828 (Firestone Plastic Co., Pottstown, Penna.) and magnesium oxide has a tensile strength at 400°F. of 825 psi and an elongation of 260%.

Aging data on these carboxy rubbers show that they are considerably better than conventionally cured diene polymers as well as being very superior in their properties at high temperatures.

It is shown that the severe processing difficulties encountered with the carboxy polymers can be greatly eased by an *in situ* hydrolysis of a butadiene-methylmethacrylate copolymer with barium hydroxide octahydrate. Such polymers have the same good high temperature properties as those prepared from butadiene and methacrylic acid.

3:55 P.M.—23—Compounding Viton Fluoroelastomer for High Pressure, High Temperature Applications. ***G. A. Gallagher, T. D. Eubank and A. L. Moran (Elastomer Chemicals Department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.). (Paper will be presented by Mr. Gallagher).***

Viton A fluoroelastomer, a copolymer of vinylidene fluoride and hexafluoropropylene, is designed for exceptionally high temperature service. It retains its elastomeric properties in the temperature range of 400°F. to 600°F., and in addition has excellent resistance to most fluids both at room and elevated temperatures. However, early attempts to utilize Viton A for high pressure, high temperature hydraulic hose applications uncovered a blistering phenomenon which limited its utility. The hose blistering phenomenon will be described and a mechanism proposed based on a simulated blistering test. Studies utilizing this test will be presented and preferred methods for avoiding the blistering will be discussed.

4:15 P.M.—24—Safe Processing Curing Systems for Viton Fluoroelastomers. ***A. L. Moran, R. P. Kane and J. F. Smith (Elastomer Chemicals Department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.). (Paper will be presented by Mr. Moran).***

The first curing systems for Viton A involve cross-linking by means of polyfunctional amines such as triethylene tetramine or peroxides such as benzoyl peroxide. While both of these systems produce good vulcanizate properties, they are somewhat impractical due to poor processing safety. Blocked diamines, such as amine carbamates, are known to produce safer processing stocks as judged by conventional Mooney scorch tests. Evidence will be presented to describe other curing systems which offer even safer processing methods.

4:35 P.M.—25—Banbury Processing Characteristics of SBR and NBR Rubbers. ***K. C. Beach, V. E. Lowery and L. F. Comper (Goodyear Tire & Rubber Co., Akron, Ohio). (Paper will be presented by Mr. Beach).***

Laboratory Banbury mixing characteristics of various types of styrene rubbers and nitrile rubbers are described. Using a simple HAF black reinforced formulation, reproducible Banbury power consumption curves characteristic of each type of rubber were obtained. Empirical measurements on rates of black pigment incorporation by the rubbers were obtained from the Banbury power consumption curves. Effect of Banbury ram pressures; revolutions per minute, and batch sizes on rate of black pigment incorporation by an oil-extended styrene rubber are described.

A simple and rapid test based upon Banbury black incorporation rates has been used as a quality control test at the polymer plant to insure uniformity in processing of each of the Plioflex styrene rubbers. Banbury black incorporation rates have also been found useful in evaluating the effect of polymerization variables on processing characteristics of styrene rubbers and nitrile rubbers.

6:45 P.M.—Division Banquet.

Friday Morning—September 12

New Elastomers and Adhesives

A. E. Laurence, Presiding

9:00 A.M.—26—A Comparison of Tack Testing Methods for Pressure-Sensitive Tape. ***Franklin S. C. Chang (Mystik Adhesive Products, Inc., Northfield, Ill.).***

The peeling resistance of pressure-sensitive tape is influenced by a number of intrinsic factors, e.g., rheological property and thickness of adhesive film, and arbitrary factors, e.g., peeling speed, peeling angle and pressure applied. Based on consideration of these factors, a comparison of several tack testing methods for pressure-sensitive tape has been made.

It was found that with no pressure applied, the peeling methods with plane adherend and rotating cylindrical adherend are practically the same. The rolling ball method, using inclined plane or curved track, operates at relatively high peeling rate and measures probably the upper limit of the resisting force, in which the flow property of adhesive plays a larger role than in other methods. The result of Hercules probe method is very close in nature to ASTM Method D-1000 for strength when applied to pressure-sensitive tape.

For quality control, the most convenient are the peeling methods. The large number of testing readings required by the other methods to obtain representative data reduces their value for production control.

9:15 A.M.—27—Studies in Tire Cord Adhesion. ***A. L. Miller and S. B. Robison (Chemicals Research Division, Esso Research & Engineering Co., Linden, N. J.). (Paper will be presented by Mr. Miller).***

The complexity of the tire cord adhesion bond is well known. In this report attempts to delineate some of the variables are described. The principal adhesion system employed was a natural rubber latex-RFL dip in conjunction with a second dip of a bromine containing isoolefin-multi-olefin copolymer (MD-571) cement, containing carbon black. The doubly-treated cord was then cured to a butyl rubber carcass stock, and adhesion was measured by the "H" test.

Our results indicate that the principal contribution to cord adhesion comes from the resorcinol-formaldehyde resin. The addition of the latex elastomer to the dip may enhance or detract from this RF adhesion, depending on its olefin activity and concentration. Elastomers containing the isoprene monomer unit are more reactive than those containing the butadiene monomer unit.

Studies of the bromine containing isoolefin-multiolefin copolymer (MD-571) cement composition indicate a strong adhesion dependence upon the activity of this elastomer, and there is a minimum bromine content for satisfactory adhesion in this system. Comparison of the bromine containing isoolefin-multiolefin copolymer (MD-571) with its chlorine containing counterpart (MD-551) indicates the former to be more reactive and results in higher cord adhesion.

9:40 A.M.—28—An Aqueous Blocked-Isocyanate Dacron-to-Rubber Adhesive. I. ***W. L. Thompson, T. B. Marshall and A. T. Sweet (Dacron Research Laboratories, E. I. du Pont de Nemours & Co., Inc., Kinston, N. C.). (Paper will be presented by Mr. Thompson).***

The high modulus, dimensional stability, strength, and chemical and thermal stability of Dacron polyester fiber have made it an attractive candidate for use in mechanical rubber goods. One of the problems which has hindered major acceptance of this fiber in such applications has been that of inadequate Dacron-to-rubber adhesion using existing aqueous adhesives.

The development of an aqueous adhesive for Dacron-rubber based upon the blocked-isocyanate principle is discussed. Several aromatic polyisocyanates and a limited number of blocking

agents were investigated as adhesive components. A latex and thickener constitute the remaining ingredients, and a screening of these components is presented. A study of the adhesive's properties regarding composition, curing conditions, curing by-products, dipped cord shelf-life, effects on fiber properties, and adhesion to various rubber stocks, both static and dynamic, are discussed.

Many of the familiar adhesion tests (H-pull, strip adhesion, CT fatigue, and dynamic adhesion) gave erroneous indications of the adhesive performance and were in general used for broad scouting. The final test was eventually an actual end use test.

10:00 A.M.—29—An Aqueous Blocked-Isocyanate Dacron-to-Rubber Adhesive. II. ***L. W. Parke (Industrial Products Research Laboratory, E. I. du Pont de Nemours & Co., Inc., Newport, Del.).***

The high modulus, dimensional stability, strength, and chemical and thermal stability of Dacron polyester fiber have made it an attractive candidate for use in mechanical rubber goods. One of the problems which has hindered major acceptance of this fiber in such applications has been that of inadequate Dacon-to-rubber adhesion using existing aqueous adhesives.

The evaluation of an aqueous blocked-isocyanate adhesive (coded D-15) for improved Dacron-to-rubber adhesion in commercial applications, particularly V-belts, is discussed. The general properties, formulation and preparation of the adhesive mixture, optimum cord dip stretching conditions and dipped cord properties are presented. Modifications to the adhesive for further improved adhesion, commercial processability and application in natural rubber, styrene rubber and chloroprene rubber systems are discussed.

An end use evaluation was made to determine the commercial acceptability of the adhesive in V-belt applications. Data on adhesion, adhesion loss and cord strength loss of D-15 treated Dacron reinforced V-belts are compared with commercial Dacron (resin latex dip) and rayon-reinforced belts.

10:20 A.M.—30—Cyanosilicone Elastomers—A New Class of Solvent Resistant High Temperature Rubbers. ***T. C. Williams, R. A. Pike and F. Fekete (Silicones Division, Union Carbide Corp., Tonawanda, N. Y.). (Paper will be presented by Mr. Williams).***

Oil-resistant elastomers capable of retaining useful properties for extended periods at elevated temperatures are of considerable interest in many fields. The discovery of thermally stable silicone polymers containing cyanoalkyl organofunctional groups has made possible a new class of solvent resistant rubbers useful over the broad temperature range characteristic of the silicones.

The preparation of cyanosilicone elastomers is conducted by methods similar to those employed with conventional silicone elastomers. The amount of cyanoalkyl substitution in the polymer, and the nature of the cyanoalkyl group is important in obtaining a high degree of solvent resistance over a wide temperature range. By proper selection of polymer composition, compound formulation, and processing, cyanosilicone elastomers are obtained which are operable under severe environments where resistance to heat and oil are important factors. The general properties of cyanosilicone elastomers are presented in comparison to a number of silicone and organic rubbers. The industrial potential of cyanosilicone elastomers is discussed briefly.

10:40 A.M.—31—The Stereospecific Polymerization of Isoprene with Lithium and Organolithium Compounds. ***R. S. Stearns and L. E. Forman (Firestone Tire & Rubber Co., Akron, Ohio). (Paper will be presented by Mr. Stearns).***

All of the alkali metals will catalyze the polymerization of dienes such as butadiene and isoprene. However, when isoprene is catalyzed by lithium or organolithium compounds in the absence of oxygen containing solvents, a stereo-regular polymer is obtained. This polymer, Coral Rubber, has molecular structure, configuration and physical properties similar to Hevea and contains 93 to 95% *cis*-1,4, and 5-7% 3,4 addition.

This stereospecific polymerization appears to proceed through a homogeneous catalytic mechanism irrespective of the solubility of the catalyst. It is suggested that stereoregularity is the result of a *cis* coordination complex formed between the monomer and the lithium atom on the terminal carbon atom of the growing polymer chain which undergoes a rearrangement to form a six member cyclic activated complex. These complexes owe their relative stability to the ability of the lithium atom to undergo hybridization and to behave in many of its reactions as an atom having considerable divalent character.

The structure of the activated complex is supported by the observed effects of temperature and type of solvent on the degree of stereoregularity obtained during the course of the polymerization reaction. Small concentrations of Lewis bases, such as ethers, completely change the stereospecific aspects of the lithium catalyzed polymerization of isoprene. This effect is due to the coordination of the Lewis base with the carbon bound lithium atom thus interfering with the ability of the lithium atom to participate in the proposed cyclic activated complex. The degree with which various Lewis bases destroy the stereoregular aspects of the lithium polymerization can be correlated with the relative base strength of these compounds.

11:00 A.M.—32—*cis*-Polybutadiene-Natural Rubber Blends. ***H. E. Railsback, W. T. Cooper and N. A. Stumpe (Research and Development Department, Phillips Petroleum Co., Bartlesville, Okla.). (Paper will be presented by Mr. Railsback).***

Although polybutadienes of high (95%) *cis* configuration have displayed hysteresis properties fully equivalent to Hevea, the processing characteristics of these rubbers are inferior to the natural polymer. It has been discovered that blending 95% *cis*-polybutadiene in 1:1 ratios with natural rubber gives compounds with good processing characteristics and excellent hysteresis properties. In addition, these blends exhibit 20 to 30% better abrasion resistance in service (retread tires) than natural rubber alone. With these retread tires cracking resistance of the experimental stocks has been superior to that of the control.

A factory test comparing 1:1 *cis*-polybutadiene-natural rubber blends to natural rubber has demonstrated that processing stocks of this type on large-scale equipment is practical. If the 10:00 x 20 truck tires on test confirm the results of the passenger retread tests, it should be possible to replace up to 50 per cent or more of the natural rubber presently used in heavy-duty tire treads. In addition, a substantial improvement in the service performance should be realized compared to that obtained using natural rubber.

11:25 A.M.—33—The Development of a Synthetic Rubber for Self-Sealing Fuel Tanks for Aircraft. ***Lawrence Spenadel (Process Research Division, Esso Research & Engineering Co., Linden, N. J.) and R. J. Good (Convair Scientific Research Laboratory, San Diego, Calif.). (Paper will be presented by Mr. Spenadel).***

Swelling behavior and low temperature properties have been measured for copolymers of butadiene-methylpentadiene. A strong dependence of swelling on the monomer ratios and sulfur content of the copolymers was found. The maximum swelling occurred when the copolymer contained 20 to 30% butadiene. The freezing temperature of the copolymer decreased with increasing butadiene percentage.

On the basis of the swelling behavior and low temperature characteristics of various polymers, a 50/50 copolymer of butadiene-methylpentadiene was developed for use as a synthetic sealant for self-sealing fuel tanks. By using only 0.25% sulfur for the vulcanization it was possible to obtain a copolymer which was superior to natural rubber in its initial swelling and also had adequate low temperature properties and mechanical strength.

Compounding for Heat-Resistant Insulations and Jackets

By A. C. ROWLEY
R. T. Vanderbilt Co., Inc., New York, N. Y.

Results of studies of butyl rubber and styrene rubber for insulations, and of neoprene for jackets

IN keeping with the continuing trend in the wire and cable industry towards higher operating temperatures, and the consequent increase in the severity of aging requirements, the work to be reported in this paper was designed to indicate compounding methods by which the necessary improvements in typical insulation and jacket formulations might be obtained.

For a number of years the most severe aging requirements generally encountered were those specified by the Underwriter's Laboratories for their RH and RH-RW designations, namely, the seven day oxygen bomb at 80°C., and the twenty hour air bomb. Insulations are required to retain 50% of their original physical properties, both tensile strength and elongation, after exposure to each aging test.

It is possible to obtain this performance with styrene rubbers simply by using a limited amount of sulfur—usually about one part per 100 parts of hydrocarbon—as vulcanizing agent, depending on more liberal amounts of ultra accelerators, such as the metal dithiocarbamates, to effect a rapid and tight cure. This leaves a minimum of uncombined sulfur in the cured compound. Such a system of vulcanization also lends itself to good moisture resistance in an insulation, especially if an oxide of lead, such as litharge, is present to scavenge as lead salts and sulfides, the accelerator fragments and residual sulfur.

With the advent of the Underwriter's RHW cable designation, which involves, along with the RH aging requirements, a six month immersion in 75°C. water for periodic measurement of insulation resistance, butyl rubber was considered for a time to be the best, if not the only, polymer available to meet the specification. The largest proportion of RHW constructions today are based upon butyl rubber, although during the past year several Underwriter's Laboratory approvals of styrene rubber insulations to meet this designation have been granted. Highly moisture resistant styrene rubber stocks have been developed, partly following the vulcanization principles outlined above, and partly through the use of increased organic fillers or resins, as opposed to inorganic or mineral fillers.

The most recent addition to the Underwriter's Laboratories list of cable designations is RHH, designed to establish specification requirements for cables that will function under 90°C. service temperatures in dry locations. There are no moisture resistance tests, but heat aging requirements are of a somewhat higher order of magnitude than for the RH designations. Insulations must withstand a 42 hour air bomb test and seven days in the air oven at 121°C., retaining 50% of their original properties after the air bomb, and 60% after the oven test. The neoprene jacket must retain useful properties (900 psi tensile, 50% elongation) after 10 days in air at 121°C.

In general, butyl rubber has again been considered the best candidate for RHH insulations by most manufacturers. In fact, it has not been unusual for RHW compounds, with little or no modification, to be submitted for approval under the RHH designation. On the other hand, there appear to be several instances where butyl rubber compounds of RH qualifications have been borderline or inadequate in aging resistance to meet RHH specifications.

In many plants neoprene jackets suitable for RHH cable have also been difficult to develop. It has been with these problems in mind, and because of requests by the compounders in the field, that the following studies were made.

Butyl Rubber Insulations

Since the quinoid vulcanizing agents have been the ones most commonly used in butyl rubber compounds for wire and cable, a typical combination of GMF, Altax, and red lead in the ratio of 2, 4, and 6 parts, respectively, per 100 parts of elastomer was chosen as a control curing system. The base formulation used throughout the work is as follows:

Butyl 035	100
Stearic Acid	1
Zinc Oxide	5
Paraffin	2
Nytal 400	50
Fine Particle Calcined Clay	100
	258

Note: This paper was presented at the Sixth Annual Symposium on "Technical Progress in Communication Wires and Cables," sponsored by the Communications Department of the U. S. Army Signal Engineering Laboratories, Asbury Park, N. J., on December 4, 1957.

TABLE I—AGED AND UNAGED PROPERTIES OF BUTYL 035 COMPOUNDS WITH VARIOUS VULCANIZING AGENT-ACCELERATOR COMBINATIONS

	Compound			
	A-1	A-2	A-3	A-4
Base Compound	258.0	258.0	258.0	258.0
GMF	2.0	—	—	—
Altax	4.0	—	—	—
Red Lead	6.0	—	—	—
Sulfads	—	3.0	3.0	2.0
Methyl Zimate	—	3.0	3.0	4.0
Captax	—	1.5	1.5	1.5
Litharge	—	—	5.0	5.0
Unaged, open steam, 45 sec. @ 388°F.				
Tensile	620	840	800	760
Elongation	670	770	770	730
Aged, 40 hours in air bomb @ 260°F., 80 lb./sq. in.				
Tensile	520	580	600	580
Elongation	550	630	610	630
% Elongation Retained	82	82	79	86
Aged 10 days in air oven @ 121°C.				
Tensile	500	500	480	600
Elongation	510	680	650	660
% Elongation Retained	76	88	85	90
Mooney Scorch, 250°F. (min.)	3	21	24	21

Butyl 035 was chosen because of its resistance to aging, and of its general use in the industry. No antioxidants were employed since the use of effective doses of these materials in the low unsaturation polymer usually has an adverse effect on cure.

Table I compares the physical properties, before and after aging, of the quinoid system with several Sulfads-Methyl Zimate-Captax-litharge combinations which have been under study for about a year at the Vanderbilt Laboratories. Sulfads is a vulcanizing agent with sufficient activity, when accelerated with Methyl Zimate and Captax, to cure Butyl 035 at a practical speed without the addition of elemental sulfur. This is of considerable interest in butyl rubber insulation compounding since sulfur, when used as a vulcanizing agent in butyl rubber, generally has a strongly adverse effect on electrical properties and moisture resistance.

Another feature of these curing systems is their relative freedom from the scorch tendencies which have characterized many of the GMF-cured compounds. Aging data shown in Table I indicate good performance for both types of compound, and no hint that the GMF system might be deficient in this respect. The Sulfads-cured stocks do, however, demonstrate slightly superior aging in the 10 day oven at 121°C.

The litharge, appearing in compounds A-3 and A-4, is added for improved moisture resistance, and at the five part level has no effect on cure speed and physical properties.

The base compound used in the above studies was mixed on water-cooled equipment. Many manufacturers use hot mixed stocks or heat-treated butyl rubber. This is frequently done with the addition of Polyac or other "promoters," in order to obtain firmer, smoother-extruding compounds in which the various ingredients are more efficiently dispersed, and in which cured physical and electrical properties are enhanced.

To study the effects of such processing on aged properties, the same base formula described above was mixed 10 minutes at 350°F. in a Banbury, both with and without the additon of 0.15 part of Polyac promoter.

Table II compares the aged properties of a hot mixed base compound for the GMF curing system and the Sulfads system. There is evidence that the quinoid cure, especially when the promoter is used during Banbury mixing, may give marginal aging results, as judged from elongation data.

The Sulfads cured compound, on the other hand, shows excellent stability regardless of mixing conditions, temperatures or promoters. Resistivity measurements on molded slabs give data in the range of 10^{14} ohms/cm.^{3} for both the GMF and Sulfads cures.

The Sulfads curing system is under study by several wire manufacturers, for both RHW and RHH designated cable, and shows much promise in both applications.

Styrene Rubber Insulations

As mentioned earlier, a sound and practical way to obtain superior aging styrene rubber compounds, such as those required to meet Underwriter's Laboratories RH specifications, has been to limit the amount of sulfur to about one part, and accelerate the cure with liberal amounts of ultra accelerators, to the point where these materials may be considered the primary accelerators for such curing systems.

Such a system, using one sulfur, three Bismate and one Altax, was described in detail in a paper in 1955 (L. A.

TABLE II—UNAGED AND AGED PROPERTIES OF HOT MIXED BASE COMPOUNDS WITH GMF AND SULFADS SYSTEM

	Compound			
	Base without Polyac		Using 0.15 Polyac in base	
	C-1	C-2	C-3	C-4
Base Compound	258	258.0	258.15	258.15
GMF	2	—	2.00	—
Altax	4	—	4.00	—
Red Lead	6	—	6.00	—
Sulfads	—	3.0	—	3.00
Methyl Zimate	—	3.0	—	3.00
Captax	—	1.5	—	1.50
Litharge	—	5.0	—	5.00
Unaged, open steam, 45 sec. @ 388°F.				
Tensile	680	800	680	800
Elongation	650	760	710	720
Aged, 40 hours in air bomb @ 260°F., 80 lb./sq. in.				
Tensile	500	580	560	620
Elongation	460	620	460	620
% Elongation Retained	71	82	65	86
Aged, 10 days in air oven @ 121°C.				
Tensile	520	500	540	460
Elongation	430	600	330	540
% Elongation Retained	66	79	47	75
Mooney Scorch, 250° F. (min.)	5	25	5	22

Brooks, J. L. Tronson and A. C. Rowley, "Ultra Accelerators in CV Vulcanization," presented before the Fourth Annual Symposium on "Technical Progress in Communication Wires and Cables," Asbury Park, N. J., December 6 to 8, 1955).

This and similar systems have had considerable success in RH and RH-RW insulations, and for this reason it has been used as a control and a starting point for the present investigation. The base formulation, prepared as a masterbatch, is shown below, and was used throughout the styrene rubber phase of the work:

GR-S 1018	25
GR-S 1503	75
Stearic Acid	1
Zinc Oxide	50
Agerite White	2
Agerite Resin D	1
Hard Hydrocarbon	30
Ceresin Wax	2
Sunproofing Wax	2
Atomite	50
Fine Particle Calcined Clay	75
	313

It has long been known that several sulfur-bearing ultra accelerators, when used as vulcanizing agents in the absence of added elemental sulfur, yield cured compounds of superior aging characteristics. Examples of such acelerators are Methyl Tuads, Methyl Selenac and Sulfads, containing, respectively, 13.3%, 17.2% and 25% available sulfur or equivalent. These materials, however, when used alone at dosages high enough to give practical cure speeds, very frequently result in scorchy stocks. For example, a CV stock vulcanized with Tuads at the required level of four or five parts will give a scorch time of 3 or 4 minutes at 250°F.

It was decided that an attempt should be made to develop a curing system based on one or more of the sulfur-bearing accelerators which would both be relatively scorch free, and possess aging properties superior to the low sulfur system.

Table III shows the principal results of the first experiment. This series was designed to study the effect of substituting a sulfur-bearing accelerator for elemental sulfur in the Bismate accelerated control. As the dosage of sulfur-bearing accelerator is increased, the Bismate is reduced (partly to keep the cost within bounds). Methyl Tuads, although included in the series, is not shown because, even at a dosage of three parts, it was not fully cured at 20 seconds and could not be considered practical, even in conjunction with the Bismate acceleration.

Selenac, in compounds B-2 and B-3, also shows lack of activity at these dosages. Although B-2 shows excellent aging, its state of cure is low at 20 seconds. B-3, while approaching an adequate cure speed, shows only a minor gain, if any, over the control in aging.

Sulfads, on the other hand, demonstrates both a high degree of activity, and markedly superior aging. The proper dosage would appear to fall between one and two parts. Compound B-4, at one part, is not fully cured in 20 seconds, while B-5 at two parts is faster than necessary, and probably somewhat scorchy. Aging is excellent for both compounds.

At this point it was decided that further evaluations should employ the air bomb with a 40 hour rather than a 20 hour exposure. In other words, an exploration would be made into the possibilities of styrene rubber stocks as candidates for RHH insulations.

Table IV shows the effects of the 40 hour air bomb on the low sulfur control versus two Sulfads Stocks, with Sulfads at the 1.5 part level. Compound D-2 shows better than 50% retention of both tensile and elongation in this drastic test, but also demonstrates fast scorch. Compound D-3, containing increased Altax for improved scorch, shows an improvement in this respect, but loses a certain amount of age resistance.

In Table V compounds E-1 and E-2 duplicate the compounds D-1 and D-2, respectively, of Table IV. The retained physicals after aging are at a lower level, generally, than in the previous experiment. Compound E-3 indicates that a reduction in Bismate not only fails to improve scorch resistance, but also is harmful to the aging characteristics. E-4 stock, on the other hand, with five parts of added litharge, shows gains in all respects. Aging is again improved. The litharge is highly beneficial for electrical properties and moisture resistance, and the time to scorch is increased to seven minutes.

TABLE III—UNAGED AND AGED PROPERTIES OF STYRENE RUBBER COMPOUNDS WITH SULFUR-BEARING ACCELERATORS

	Compound				
	B-1	B-2	B-3	B-4	B-5
Base Compound	313	313	313	313	313
Sulfur	1	—	—	—	—
Altax	1	1	1	1	1
Bismate	3	2	1	3	2
Methyl Selenac	—	2	3	—	—
Sulfads	—	—	—	1	2
Unaged, open steam, 20 sec. @ 388°F.					
Tensile	860	720	880	520	900
Elongation	750	900	800	940	710
Aged, 20 hours in air bomb @ 260°F., 80 lb./sq. in.					
Tensile	780	1040	1100	800	860
Elongation	380	580	450	680	430
% Elongation Retained	51	64	56	72	61
Mooney Scorch, 250°F. (min.)	32	11	11	8	5

TABLE IV—UNAGED AND AGED PROPERTIES OF STYRENE RUBBER COMPOUNDS WITH SULFUR AND SULFADS

	Compound		
	D-1	D-2	D-3
Base Compound	313	313.0	313.0
Sulfur	1	—	—
Altax	1	1.0	3.0
Bismate	3	2.5	2.5
Sulfads	—	1.5	1.5
Unaged, open steam, 20 sec. @ 388°F.			
Tensile	900	880	840
Elongation	680	780	850
Aged, 40 hours in air bomb @ 260°F., 80 lb./sq. in.			
Tensile	760	800	900
Elongation	240	420	370
% Elongation Retained	38	54	44
Mooney Scorch, 250°F. (min.)	27	5	7

TABLE V—UNAGED AND AGED PROPERTIES OF STYRENE RUBBER COMPOUNDS WITH BISMATE AND LITHARGE

	Compound			
	E-1	E-2	E-3	E-4
Base Compound	313	313.0	313.0	313.0
Sulfur	1	—	—	—
Altax	1	1.0	1.0	1.0
Bismate	3	2.5	1.0	2.5
Sulfads	—	1.5	1.5	1.5
Litharge	—	—	—	5.0
Unaged, open steam, 20 sec. @ 388°F.				
Tensile	1300	840	800	780
Elongation	760	790	840	890
Aged, 40 hours in air bomb @ 260°F., 80 lb./sq. in.				
Tensile	820	700	620	800
Elongation	220	350	280	480
% Elongation Retained	29	44	33	54
Mooney Scorch, 250°F. (min.)	28	6	5	7

While this scorch rate is much faster than that of the low sulfur control, it does not necessarily place the Sulfads system in the category of an impractical compound.

Although the data are as yet incomplete, there is evidence that the use of the delayed-action accelerator Amax in place of Altax in formulations of this type results in improved scorch control. In any case, with due caution in processing, it appears probable that styrene rubber compounds can be developed for successful production of RHH insulations.

Neoprene Compounds

In the programs on both butyl rubber and styrene rubber, the gains in aging were through developments in the curing systems, without modification or increase in the antioxidant dosages. In the neoprene studies, the first approach was to evaluate antioxidants and their combinations.

An exploratory series of experiments were performed with a neutral Neoprene W compound containing no blacks, in which interactions were found between Agerite Stalite, Agerite Superlite, Butyl Zimate, and Zetax. The significant stocks of the series are shown in Table VI.

These data show the step-wise gains in aging performance by, first addition of Agerite Superlite to the straight Agerite Stalite compound, and then the addition of either Butyl Zimate or Zetax to the above antioxidant combination. Butyl Zimate and Zetax are both accelerators for styrene rubber and natural rubber vulcanization, but in this Neoprene W stock, only the Zetax has a strong effect on cure activity, as shown by the scorch rate.

It was decided that these combinations of ingredients should be evaluated in a typical Neoprene W wire compound. The next series of experiments used the black base compound shown below:

Neoprene W	100
Reogen	2
Extra Light Calcium Magnesia	4
Sunproof	3
Light Process Oil	6
P-33	30
Atomite	80
	225

TABLE VI—UNAGED AND AGED PROPERTIES OF NEOPRENE W COMPOUNDS WITH COMBINATIONS OF ANTIOXIDANTS

	Compound			
	F-1	F-2	F-3	F-4
Neoprene W	100	100	100	100
Extra Light Calcium Magnesia	4	4	4	4
Light Process Oil	8	8	8	8
Atomite Whiting	80	80	80	80
Fine Calcined Clay	30	30	30	30
Zinc Oxide	10	10	10	10
Thiate A	2	2	2	2
Agerite Stalite	4	4	4	4
Agerite Superlite	—	1	1	1
Butyl Zimate	—	—	1	—
Zetax	—	—	—	1
Unaged, open steam, 45 sec. @ 388°F.				
Tensile	1020	1020	1100	1140
Elongation	860	870	900	880
Aged, 10 days in air oven @ 121°C.				
Tensile	860	960	920	1000
Elongation	320	440	450	570
% Elongation Retained	37	51	50	65
Aged, 10 days in oxygen bomb @ 80°C., 300 lb./sq. in.				
Tensile	860	860	960	1000
Elongation	460	600	650	690
% Elongation Retained	53	69	72	78
Mooney Scorch, 250°F. (min.)	8	9	7	5

TABLE VII—UNAGED AND AGED PROPERTIES OF NEOPRENE W HEATER CORD COMPOUNDS WITH DIFFERENT ANTIOXIDANT COMBINATIONS

	Compound				
	G-1	G-2	G-3	G-4	G-5
Neoprene Heater Cord Base	225.0	225	225	225.0	225.00
Zinc Oxide	5.0	5	5	5.0	5.00
Thiate A	2.0	2	2	1.0	1.00
Sulfads	—	—	—	0.5	0.25
DPG	—	—	—	—	0.25
Rio Resin	3.0	—	—	—	—
Agerite White	0.5	—	—	—	—
Agerite Stalite	2.0	4	4	4.0	4.00
Agerite Superlite	—	1	1	1.0	1.00
Butyl Zimate	—	1	—	1.0	1.00
Zetax	—	—	1	—	—
Unaged, open steam, 45 sec. @ 388°F.					
Tensile	1480	1420	1440	1760	1660
Elongation	830	820	870	800	830
Aged, 10 days in air oven @ 121°C.					
Tensile	1300	1240	1240	1160	1120
Elongation	280	260	310	420	420
% Elongation Retained	34	32	36	53	51
Aged, 10 days in oxygen bomb @ 80°C.					
Tensile	980	980	980	1060	910
Elongation	510	580	590	510	440
% Elongation Retained	61	71	68	64	53
Mooney Scorch, 250°F. (min.)	13	13	6	6	15

This compound is typical of many of the black neoprene 75°C. heater cord formulations used in the industry. Neoprene W is becoming more and more generally used in this application because of its superior aging properties. For the same reason Atomite is preferred over the clays as the mineral filler.

Table VII shows the outstanding stocks developed in this series. The control, cured with Zinc Oxide-Thiate A, has in conjunction with the heat stablizer Rio Resin, a potent system of antioxidants, consisting of Agerite White and Agerite Stalite, favored for its excellent performance in 75°C. wire. These data show it to resist aging in the 80°C. oxygen bomb very well, but only 34% of the original elongation is retained after the 121°C. air oven test.

Compounds G-2 and G-3 show the results for the Agerite Stalite-Agerite Superlite-Butyl Zimate, and the Agerite Stalite-Agerite Superlite-Zetax combinations, respectively. They show strong gains in the oxygen bomb aging, but give no advantage in the 121°C. air test. The Zetax, even to a greater degree than in the earlier work, markedly increases the scorch rate of the zinc oxide-Thiate A curative.

At this point, attempts were made to modify the curing system with a number of additional materials. It is generally known that sulfur added to Neoprene W as a curative gives improved physicals, and may be controlled as to scorch with DPG and/or other materials. On the other hand, the use of elemental sulfur has a degrading influence on aging properties, as was confirmed in this work.

However, it was found that Sulfads when used with zinc oxide-Thiate A, as in compounds G-4 and G-5, has a marked effect on cure and physical properties, and at the same time improves the aging in the 121°C. air oven. Furthermore, the use of 0.25 part of DPG with the Sulfads effectively controls its scorch tendencies, while excellent aged properties are retained, especially in the 121°C. air test.

Conclusions

(1) The results of the compounding studies reported in this paper indicate ways in which superior heat aging performance suitable to meet that required by Underwriter's RHH designation may be built into butyl rubber and probably styrene rubber for insulations, and into neoprene for jackets.

(2) Sulfads is shown to be a particularly valuable vulcanizing agent and accelerator for all three types of elastomer, highly useful when such superior agings are required.

(3) For neoprene, an antioxidant combination of Agerite Stalite, Agerite Superlite and Butyl Zimate has a strong protective action for elevated temperature service.

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Coming Next Month...

The Role of Polymers in Solid Propellants—By John M. McDermott, Thiokol Chemical Corp., Ogden, Utah.

A full description of the basic process currently in use for the preparation of rubbery-rocket-fueled engines, plus an analysis of the role of the rubber industry in the rocket field, at present and in the future.

Flame Resistance of Neoprene—By D. C. Thompson, J. F. Hagman and N. N. Mueller, Elastomer Chemicals Department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Results of a study, using a new method for testing the combustibility of elastomers, of the role of compounding ingredients on the flame resistance of neoprene, with data on the effects of various fillers.

Molded Mechanical Rubber Goods—A Symposium Held by the Southern Rubber Group.

A survey of molding techniques and equipment and of compounding variables and problems presented by two speakers before the Southern Rubber Group, and the questions and answers which followed their addresses.

PLUS A R/A SPECIAL INDUSTRY REPORT

Promotional Films for the Rubber Industry.

How the independent manufacturer can make his own promotional films on a low-cost "do-it-yourself" budget.

FIG. 1—In-process creamery ree's of hose are transferred on pallets by an electric fork truck in the Braided Hose Finishing Department of Gates. The stand-rest position of the driver aids his visibility.

How Gates Rubber Co. is saving time, manpower and space by the use of

Electric Fork Trucks for Materials Handling

Proper application of the correct materials handling equipment has reaped dividends for one rubber goods manufacturer

GATES RUBBER CO. of Denver, Colorado had space and handling problems in three specific areas of its huge plant back in 1954. But as a result of converting to eleven high-stacking electric fork trucks that were "tailored" to its operation, Gates not only reduced space requirements, thereby "expanding" its plant, but also cut handling time in half, with less manpower.

The three areas where Gates has proved over the last three years that the proper application of the correct materials handling equipment will be rewarded by substantial cash savings are the Braided Hose Finishing Department, Tire Warehouse and Shipping Department and Tread Rubber Storage and Shipping Department. In all three places, Model "E" electric fork trucks produced by Lewis-Shepard Products, Inc., Watertown, Massachusetts, are in operation, handling tires, belts and tread rubber.

At the Braided Hose Finishing Department, it was the conversion from both hand and power equipment to

Departments where a new fork truck-pallet system has produced cash savings—

Braided Hose Finishing
Tire Warehouse and Shipping
Tread Rubber Storage and Shipping

just one L-S Model "E" fork lift and pallets that reaped the dividends. Under the previous system, all in-process stock and some of the finished products were placed on flat-bed skids and transported by power platform trucks. Other finished products were moved on skids by hand platform trucks.

Today, one Model "E" electric fork truck with a 2000-pound capacity does the job (Figure 1). This truck, operated by a driver from a standing position while riding, carries all in-process stock on 48- by 48-inch wood pallets. Finished goods, which are placed in cartons, are also palletized and moved to the warehouse by the L-S fork truck.

The new electric fork truck-pallet system eliminated one stockman's time per shift, reports Vern Bybee, industrial engineer in the company's materials handling section. In addition, it allowed incorporating some of the stockmen's duties into the incentive rates of the fork truck operators.

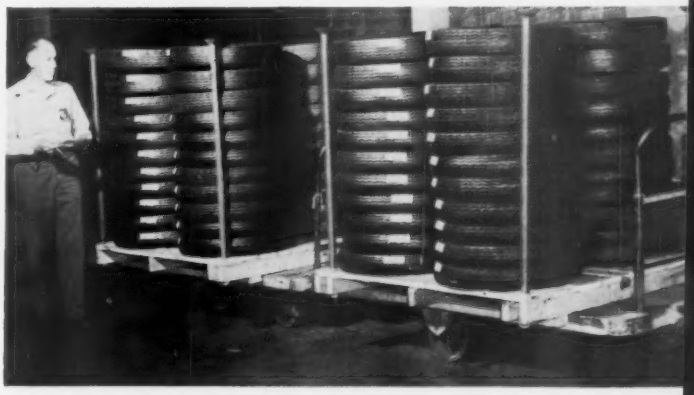


FIG. 2—Tires are received in the Tire Warehouse and Shipping Department on oversized 60-inch pallets which are transported four at a time by a tractor. Upon receipt they are logged in by a checker.

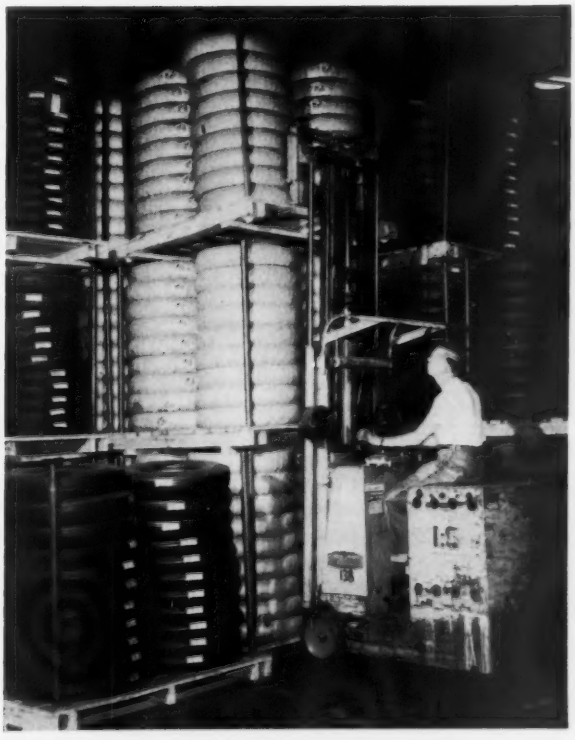


FIG. 3—After the tires are removed from the trailers, they are stacked in the warehouse. Here a fork truck handles thirty-six in a single load, storing them in stacks that reach all the way to the ceiling.

Hand handling was completely eradicated from the warehousing operation, as the movement of stock from the manufacturing area into storage is now fully mechanized. In fact, the required time for stocking finished products was reduced 37 per cent.

High Stacking Saves Storage Space

In the realm of storage space, a 20 per cent savings was achieved. This was made possible by the high-stacking feature of the fork trucks, and their ability to maneuver in aisles only 11 feet wide—a space extremely narrow for this type truck to operate in. A 5 per cent space savings in the braided hose production area was also recorded.

Equally startling results were achieved in the Tire Warehouse and Shipping Department. Here, under the old system, tires were transported from the production area by trailer trucks. As each load consisted of various sizes of tires, they had to be sorted when received at the warehouse. Next, tires were moved to the storage section via trailer truck and hand stacked on the floor. Order picking, also a hand operation, was done right in the storage area. Tires were then moved by hand truck to the shipping room.

Today, all tires are placed on oversized 60-inch pallets in the production area. They are transported to the Tire Warehouse and Shipping Department by a tractor, which hauls a number of four-wheel trailers. After the

FIG. 4—An electric fork truck with special hydraulically operated forks handles tires without the aid of pallets. Here an operator eases his load of four tires into position at the storage area.

tires are checked in at the warehouse section (Figure 2). they are towed to their appropriate stocking area. L-S Model "E" fork lifts remove the palletized loads from the trailers, and high stack them to the ceiling. (Figure 3).

The pallets utilized in this operation are a special type devised for handling the tires. All have metal arms at each corner to stabilize the loads of tires, and hold about 40 tires per pallet. The electric fork trucks are used in moving tires to the order picking area, shipping area, in loading railroad cars and trucks, and in all other operations where pallet load quantities are desired.

Just recently Gates equipped one of its electric fork trucks with special clamping forks to handle tires without the aid of pallets. This fork lift is used in the section where motor truck tires are stored (Figure 4).

Over-all manpower requirements in the tire warehouse have been reduced by 40 per cent due to the mechanization of materials handling, it has been calculated. And, because the Model "E" trucks can stack goods to heights of 15 feet, or right to the ceiling in the warehouse, there is now 31 per cent more floor space available. This floor space saving has eliminated the need of considerable outside warehouse rental space, according to Mr. Bybee.

New Procedures Save Manpower

In the Tread Rubber Storage and Shipping Department, labor savings are the big thing. The manpower reduction in this case was around 34 per cent, due to the fact that cartons are now handled in unit loads of 18 to 50, instead of smaller lots.

In the previous system all finished tread rubber was packed in cartons and hand stacked on skids in the production area. Next, the skids were moved to the Storage and Shipping Department by platform trucks. Cartons were removed from the skid and stacked on the floor or in storage racks by hand.

Order picking was also done by hand. In this case, cartons were removed from storage, manually placed on four-wheel carts, and finally pushed to the shipping room. Here, they were transferred from the cart to the outgoing motor highway truck or railroad boxcar by sheer muscle.

Now, cartons are palletized on tractor-trailer trains at the production area and towed to the warehouse. Fork trucks remove the palletized loads from the trailers, and place them in the storage racks, stacking pallets three high, or up to the ceiling.

When goods are needed for outgoing shipments, the fork trucks remove them from the racks and place them on tractor-trailer trains. The trailers are towed to the shipping room, where another L-S Model "E" truck picks palletized loads from the trailers and deposits them into the outgoing carriers.

Convenience and Maneuverability

Why were Model "E" trucks selected for these operations? Primarily because of the stand-rest driving position, from which the truck operator only has to step into or out of his vehicle. Maneuverability in tight areas was another important consideration in their selection, according to Mr. Bybee.

The choice of electrically-powered trucks over other types was a "natural" since the trucks were to operate in confined areas. With the electrics, there are no odors or fumes to contend with. In addition, it was also felt that the long range cost of electric trucks would be less. And Mr. Bybee reports that a sealed bearing feature of the Lewis-Shepard trucks, said to substantially cut service time, was another factor in the choice.

The trucks are used from 16 to 24 hours per day, five days per week. After each eight-hour shift, newly-recharged batteries are placed in the trucks at a convenient battery recharging station set up within the plant. Batteries are recharged for eight hours, after which they are ready for immediate use.

Gates Rubber Co., which was founded in 1911, is the sixth largest firm in the rubber industry. It now employs about 6500 people across the nation. Major products are V-belts, hose, tires and mechanical rubber goods. The company is keenly aware that out-dated materials handling practices add nothing to the value of its products, only to the costs. Thus, the conversion to the electric fork truck-pallet system in three sections of its plant.

That the new methods have paid for themselves is proven. But, as evidenced by the clamping attachment recently added to one of the trucks, it is obvious that Gates does not view materials handling as a static field. Rather, the company constantly pushes towards more economical methods. Like any other company where materials handling is the full-time responsibility of experts, Gates expects that it is an area where costs will gradually decrease with the passing of time. Installation of the electric fork trucks, with its resulting savings in space, handling time and manpower, is a recent example of how forward-looking planning pays off; such planning is part of the Gates method of operation.

Editorials..

Export Policy

► A recent situation involving an American concern is pointing up the necessity for a change in American trade policies in relation to dealings with the Soviet Union. About two years ago, Hale & Kullgren, Inc., of Akron, attempted to secure a subcontract with a British combine that was to build a $30 million tire plant in Russia. Complying with the Export Control Act, Hale & Kullgren asked the U. S. Commerce Department for permission to do the work which involved participation in the design of the Russian facility. For more than a year and one-half the Commerce Department refused its permission. Hale & Kullgren repeatedly appealed the ruling with no results. Finally, after an audience with Secretary of Commerce Weeks, the ruling was reversed. In the meantime, however, the British combine had arranged to have the engineering work done by a British concern. As an end result, the American company lost a $300,000 contract.

Andrew Hale, president of the Akron firm, said he was struck by the fact that while his firm was prevented from supplying "expertese" directly or indirectly to the Russian project, American rubber machinery firms could have their equipment built in England under license and sold to the Russians. Many important producers of United States' tire-making equipment have long since licensed companies in England, France and Germany to produce equipment of U. S. design. Shipment of such equipment to Russia is not prohibited by the manufacturing countries.

When the ruling in the Hale & Kullgren case was changed, the Commerce Department stated that it had received "new information" from American manufacturers indicating that the ban on U. S. engineering firms would not prevent the British from building the plant in Russia. Fully a year ago, however, the Commerce Department admitted that it already knew this. At that time the Department acknowledged that Britain, France and Germany were able to sell to the Russians "any tire plant technology" that they may have developed. The Department added that: "It might be rather difficult to distinguish, with respect to tire plant design technology, whether it had been developed entirely independent of data received at some earlier date from the U. S."

Various Congressmen and Senators, from both parties, have now called for a review of American export policies and particularly the manner in which they affected the Hale & Kullgren case. On the record, the role of the Commerce Department in taking one position and then reversing itself on the basis of information that was not "new", seems rather weak.

Let us all accept the premise that the vast majority of U. S. citizens would be in accord with any policy which would aid this country in any economic or political struggle with the Soviet Union. Commerce Department policies to date, however, at least as they have had bearing in the Hale & Kullgren case, have not prevented the construction of the Russian tire facility. These policies have only lost for an American concern the opportunity to secure a contract. An Assistant Secretary of Commerce for International Affairs, in a letter to an interested Congressman, stated that "I would have to agree that the service to U. S. engineers is marginal. The British undoubtedly can build the plant."

As a sidelight to the situation, Mr. Hale points out that during World War II, he and Mr. Kullgren, under orders from the War Production Board, were assigned to ship a tire plant to Russia. This plant, states Mr. Hale, still compares favorably with our most efficient facilities. Mr. Hale goes on to say that "The philosophy of the English industrialists is quite realistic in that doing business with the Russians can promote a closer and more friendly feeling. The cause of peace cannot be advanced by refusing to deal with them. I believe this is becoming more and more apparent."

Several thoughts should be registered on what has transpired to date. Firstly, it must be assumed that the Commerce Department has acted in what it considered to be the best interests of the country. This does not excuse, however, the inordinate delay in rendering a decision on an appeal to an original ruling which is debatable in itself. The Commerce Department apparently had all the facts it finally used in determining the case about a year and one-half before it made its judgment known. Why the delay? Secondly, the time may now have come to re-examine our trade policies. Representative Glen Lipscomb (Calif.), puts it this way: "Perhaps," he states, "it is time for Congress to take a new look at our export control policy."

Special Industry Report

Business Failures

among rubber manufacturers

DURING 1957 business failures in the United States were up eight per cent in number and nine per cent in creditors' losses over the preceding year. In the same year increases were noted in all the major classifications of industry. Here is how the over-all picture of failures looked in 1957:

	Percentage Change 1956-1957	
	Number	Liabilities
Total businesses, all lines	+ 8	+ 9
Total manufacturing	+ 6	+ 3
Total wholesaling	+ 2	+ 4
Total retailing	+ 9	+20
Total construction	+15	+ 9
Total commercial service	+ 7	+ 9

The above picture, revealed in this study for RUBBER AGE by James J. Etro, Dun & Bradstreet, Inc., is not a happy one and it would be consoling to say that these increases did not carry over into the failure statistics for rubber manufacturers. However, here is how the figures fell.

During 1957, 12 rubber manufacturing businesses in the United States failed with liabilities of $728,000. Percentagewise, this represented an increase of 71 per cent in number as compared to 1956's seven failures and an increase of 218 per cent in creditors' losses as compared to 1956's reported $229,000. The average liability for each rubber manufacturer that failed in 1957 was $60,667—an increase of 85 per cent compared to 1956's average liability per failure of $32,714. A look at the failure statistics for the first four months of 1958 shows a much brighter picture for the industry (two failures with liabilities of $92,000 during January to April, 1958 versus five failures with liabilities of $239,000 during January to April, 1957).

It should be pointed out that the above figures include only rubber manufacturers that failed with losses to creditors. Not counted as commercial failures in Dun & Bradstreet statistics are those who liquidated voluntarily and paid whatever obligations were outstanding at the time they closed their doors. There is, of course, a great deal of such activity going on. Below the relatively stable surface of a business population of approximately 4,200,000 firms in the United States, some 350,000 to 400,000 firms discontinue business every year—only to be replaced by an equal or slightly higher number.

Some of these concerns which go out of business do so with sizable losses to those who put up the money, but while they do not look upon themselves as having been a business success, they are not counted among the failures. Also not included in Dun & Bradstreet failure tabulations are transfers of ownership. Therefore, the 12 failures discussed above are not necessarily the only rubber manufacturing businesses that ceased operations in 1957—but they were the ones who did so at the expense of someone else.

Success and Failure—Why?

Why does a business fail? Is it insufficient capital? Is it inadequate sales or the rising costs of doing business or excessive fixed assets? Basically, these are operating problems which every business and every businessman experience. They are not the causes of a business failure, but the factors which influence the success or failure of a business operation.

What then is the cause of a business failure? One pattern has recurred consistently over the years in Dun & Bradstreet's studies into the causes of bankruptcies involving losses to creditors. A failure can be traced in most instances directly to a clearly identifiable human weakness on the part of the people running the business. This human failure may be in judgment, personality, decision or know-how.

These weaknesses are always present in some portion of the business community. What is making them more costly now than ever before—and what is causing an increasing number of failures—is (1) the competitive pressures of an increasing number of concerns going into business; (2) the difficult and increasing cost-price squeeze in which all business is finding

The story for industry as a whole—

Although business failures for all industries are currently climbing to new postwar peaks, according to a study just completed by the Business Economics Department of Dun & Bradstreet, the failure rise has slackened significantly. The increase amounted to 8 per cent in 1957 as compared to 16 per cent between 1955 and 1956; in the first three months of 1958 it amounted to 10 per cent, however. The figures of the study are based on failures likely to end in losses to creditors. Other highlights revealed in the survey are:

► **RATE**: Related to the growing business population, the casualty rate remains considerably less severe than in 1939 (52 concerns failed in 1957 for every 10,000 listed in the Dun & Bradstreet Reference Book, well below the 70 per 10,000 recorded in 1939).

► **SIZE**: Dollar liabilities involved in 1957's failures surged to $615 million—a new high. Casualties in the medium-size range—$5,000 to $1 million—accounted for the sharp rise.

► **AGE**: Businesses over ten years old continued to claim a growing portion of total failures, rising from 9 per cent in 1947 to 19 per cent in 1957. Failures among enterprises in their first five years of operation are still large—60 per cent of the 1957 casualties fell in this group.

itself; (3) ever changing patterns in consumer demand and corollary changes required in methods of doing business, and (4) lack of competence in managerial capacity and judgment.

But why then during a period of growth in all phases of business activity should failure figures be soaring? Some may answer this with the rather widespread notion that failures are caused by business conditions. However, while it is true that general business conditions play their part in most failures and that failures are one of the key indicators of business conditions, the fact remains that all of the businesses in a line that did not fail operate within the framework of the same general business conditions as those that did fail.

The Basic Factor

The answer to a failure during "good times" would seem to lie in the proven fact that unusually high levels of sales and output encourage many inexperienced people to start business in the hope of learning as they go, while capitalizing on the prevailing general prosperity. Basically, a businessman's own ability — and not the economic climate of the time — counts most in a successful business operation.

In its studies of the causes of failure, Dun & Bradstreet tries to get at the basic cause of each failure. To ascertain why the business failed, the Dun & Bradstreet reporter makes a final investigation of the account when the failure is reported. During this final investigation, the reporter will interview, whenever possible, a principal of the business. In addition, investigations are made with banks, suppliers and other outside sources to help form an objective opinion as to the failure cause.

There are, of course, certain hazards and limitations in summarizing all the complex factors which cause a business to fail. Certain factors may be more accurately evaluated and judged by some reporters and the final analysis may contain some discrepancies. Also, the information needed to explain why a failure occurred may not always be available after the failure. However, when you add up the results of these investigations, a definite pattern of the causes of failures emerges and is well worth studying.

The number of rubber manufacturers that failed in 1957 is too small in itself to break down separately, but the study of the causes of failures among all manufacturers indicate danger signals that rubber manufacturers may use to check their operations. The causes of failure revealed in a study that Dun & Bradstreet did on the 2,411 manufacturing failures, including rubber manufacturers, for the year 1957 are shown in the accompanying table.

These figures, however, account for only 6.7 per cent or 164 of the 2,411 manufacturing failures in the United States in 1957. Undoubtedly, some of these failures were caused by circumstances beyond human control or "Acts of God." Some of them, however, could have been prevented through proper insurance.

Failures of Rubber Manufacturers, 1934-1957

Year	Number	Liabilities	Year	Number	Liabilities
1934	14	$ 650,000	1946	1	410,000
1935	13	441,000	1947	6	813,000
1936	11	732,000	1948	7	408,000
1937	12	997,000	1949	13	376,000
1938	12	259,000	1950	13	646,000
1939	25	367,000	1951	2	25,000
1940	11	228,000	1952	9	490,000
1941	16	130,000	1953	5	382,000
1942	7	47,000	1954	7	1,045,000
1943	5	68,000	1955	13	997,000
1944	0	—	1956	7	229,000
1945	3	35,000	1957	12	728,000

Source: Dun & Bradstreet, Inc. This record includes those businesses that ceased operations following assignment or bankruptcy; ceased with loss to creditors after such actions as execution, foreclosure, or attachment; voluntarily withdrew leaving unpaid obligations; were involved in court actions such as receivership, reorganization, or arrangement, or voluntarily compromised with creditors.

Dun & Bradstreet tried to get at the real cause behind the other 2,247 or more than nine out of ten failures, which could not be explained by obvious, outside circumstances. Here is the way the figures fell:

	Number	Per cent
Incompetence	1,211	50.2%
Unbalanced Experience	416	17.3
Lack of Managerial Experience	363	15.1
Lack of Experience in the Line	257	10.7

In other words, the bulk of the manufacturing failures in 1957 were management failures.

This group of 2,247 failures were further analyzed as follows by the surface causes, or the reasons given as excuses, for failure:

	Number	Per cent
Inadequate sales	1,302	54.0%
Competitive weakness	398	16.5
Receivables difficulties	292	12.1
Excessive fixed assets	225	9.3
Heavy operating expenses	202	8.4
Inventory difficulties	141	5.8
Poor location	10	0.4
Other	119	4.9

Because some failures in this analysis were attributed to a combination of apparent causes, the figures add up to slightly more than the 93.3 per cent of the failures analyzed.

CAUSES OF MANUFACTURING FAILURES IN 1957
2,411 CASES STUDIED

Causes	No.	Per cent
Negleet	**68**	**2.8%**
Poor health	47	1.9%
Bad habits	9	0.4
Marital difficulties	4	0.2
Other	8	0.3
Fraud	**40**	**1.6%**
Irregular disposal of assets	32	1.3
False financial statements	2	0.1
Premeditated overbuy	1	0.0
Other	5	0.2
Disaster	**29**	**1.2%**
Fire	17	0.8
Flood	3	0.1
Strike	4	0.2
Employees' fraud	1	0.0
Burglary	1	0.0
Other	3	0.1
Unknown	**27**	**1.1%**

Challenges for 1958

Although it is not a part of Dun & Bradstreet's function to predict the future, it is reasonably safe to say that 1958 will bring to all businessmen problems to be solved and challenges to be met. A good long look at himself and his business never did any businessman any harm, and if the underlying causes of the 2,411 manufacturing failures in 1957 suggest areas of change or investigation, all well and good.

No matter what 1958 brings there is always room for the businessman who knows what he is doing and how to do it. While a rubber manufacturer's business involves a great deal of special knowledge, he also needs to know as much as he can about the finacial, credit, and general management aspects of his business. This is as important to the one man operator as to those who employ thousands. Technical knowledge and service may make the initial profits, but it takes sound management policies and practices to hold on to these profits and to build the business.

IRSG Holds 14th Meeting in Germany

News Reports
and Industry Activities
RUBBER AGE • JULY, 1958

IRSG thinks that in 1958:

- **Natural production will exceed world consumption**
- **Synthetic requirements will be much below capacity**
- **No action will be taken on stabilizing natural prices**

► The Fourteenth Meeting of the International Rubber Study Group was held in Hamburg, Germany, under the chairmanship of Dr. Albert Schafer, delegate of the Federal Republic of Germany, from June 9 to 14. P. F. Adams, delegate of the Federation of Malaya, and Willis C. Armstrong, delegate of the United States of America, served as vice-chairmen.

The meeting was attended by delegations from Australia, Austria, Belgium, Canada, Ceylon, Czechoslovakia, Denmark, France, Federal Republic of Germany, Hungary, Indonesia, Italy, Japan, Liberia, Federation of Malaya, Netherlands, Thailand, United Kingdom, United States of America and Viet-Nam, and by observers from the International Rubber Development Committee, the Food and Agriculture Organization, the Organization for European Economic Cooperation, and the International Bank for Reconstruction and Development.

Statistical Position Examined

The statistical position of rubber was examined and estimates were made for natural and synthetic rubber requirements and supply during 1958. It was estimated that the world might consume some 1,915,000 long tons of natural rubber and approximately 1,237,000 long tons of synthetic rubber, apart from synthetic rubber produced in non-member countries. World production of natural rubber for 1958 was estimated at about 1,920,000 long tons while production capacity of synthetic rubber in member countries was considered to be sufficient to meet all requirements. The tables of estimates made by the Group show that estimated requirements and supply of natural rubber are approximately in balance.

Excellent progress in replanting with high-yielding materials was reported and it was observed that other measures to increase production efficiency of the natural rubber industry are being vigorously supported. Some producing countries, it was noted, have substantially increased the funds available for research and development.

Activity on Grading

Work on the improvement in the grading of natural rubber and the continued progress made in the improvement and development of new types of natural rubber was also cited. Consumer interest has been observed in specialized rubbers, but it was considered that at this stage the initiative for promoting these rubbers rests with the producers, who should make their own arrangements with consumers and traders to provide supplies through normal market channels. The Group felt that the use of specialized rubbers would be greatly facilitated if producers could make samples of these materials and distribute technical information about them on an adequate scale.

The Group expressed its appreciation of the work done by the Joint R. M. A.-R. T. A. Type Sample Committee of New York in the preparation and issue of international type samples. Completion of the preparation and issue of type samples is expected by the end of 1958.

A decision was made to call to the attention of the Customs Cooperation Council in Brussels the importance attached by the Group to the expansion of trade in rubber, both natural and synthetic, and its interest in possible customs definitions which might affect this trade, particularly with reference to the progressive development in the range and application of modified forms of both materials.

A number of alternative suggestions from governments were considered for reducing fluctuations in the price of natural rubber. While it was agreed that greater stability in price is desirable, there were differing views regarding the desirability or practicability of achieving this by means of an international stabilization scheme. Specific proposals were made with the objective of achieving greater stability in prices, and these proposals will be further studied by member coun-

Estimated Natural Rubber Production in 1958 (in 1,000 long tons)

Territory	
Indonesia	680
Malaya	654
Thailand	133
Ceylon	90
Viet-Nam	69
British Africa	48
Sarawak	40
Liberia	39
Belgian Congo	37
Cambodia	32
Other British Borneo	21
Burma	12
Papua	4
French Africa	4
Other Countries	57
Total	1,920

tries. With regard to the possibility that circumstances might change so as to alter the balance of the considerations for and against international measures, the Management Committee was instructed to keep the matter under review.

A statement of the delegate of the United States of America was noted to the effect that the United States Government had announced on June 13, regarding the United States' strategic stockpile, that present disposal policies remain unchanged, and that materials in the stockpile in excess of objectives are not to be disposed of if disposal would disrupt the market.

At the close of the meeting, the Group accepted an invitation from the Federation of Malaya to hold its next meeting in Kuala Lumpur and decided that the meeting should be held some time in the first half of 1960 at a date to be determined later. The Management Committee was authorized to call an earlier meeting at any time in the future should circumstances require.

Estimated Natural and Synthetic Rubber Requirements in 1958 (in 1,000 long tons)

Territory	Natural	Synthetic*	Total
U. S. A.	482	853	1,335
U. K.	182	70	252
France	134	63	197
Federal Republic of Germany	126	63	189
Japan	130	17	147
Canada	38	49	87
Italy	54	22	76
Australia	35	16	51
Czechoslovakia	50	+	50
Belgium	21	4	25
Netherlands	18	6	24
Austria	13	3	16
Hungary	10	+	10
Denmark	7	1	8
Other Countries	615	70	685
Total	1,915	1,237	3,152

+ Consumption data for synthetic rubber exclude synthetic rubber produced in non-member countries. * The oil-content of oil-extended synthetic rubber is included in the figures.

Wellco Opens New Plant

► Dedication ceremonies were held recently to inaugurate the opening of the 5,200 square foot new machinery-building plant of Wellco-Ro-Search Inc. in Hazelwood, N. C. The new plant will manufacture vulcanizing presses and molds for "Process 82" footwear and other Ro-Search footwear manufacturing processes. The machinery-building unit formerly shared a portion of the Wellco plant with the "Foamtread" footwear manufacturing department. The transfer to the new site has enabled Wellco to expand its footwear manufacturing facilities. Approximately 20 per cent of Wellco's slippers are now being made in Puerto Rico.

At the same time, Michel Botau was appointed chief rubber chemist at the Wellco Waynesville, N.C., headquarters. Mr. Botau was previously employed by the A. C. Rubber Manufacturing Co. Ltd. of Vancouver, B. C., and the Acton Rubber Co., Ltd., of Montreal, Que., Canada. He is a graduate of the University of Paris (France) and continued his education in rubber chemistry and technology at the French Rubber Institute.

Pliovic VO Dispersion Resin

► Pliovic VO, a new polyvinyl chloride dispersion resin with exceptional electrical properties and viscosity stability characteristics, developed for plastisol and organosol applications, has been introduced by the Chemical Division, Goodyear Tire & Rubber Co. Akron, Ohio. Wide flexibility in choice of compounding ingredients is made possible through low initial viscosity and good shelf life. In addition to such electrical applications as wire coating, cable covering and potting compounds, the new resin is expected to find extensive use in rotational molding operations. Pliovic VO for roto-casting furnishes the fluidity necessary for complete and uniform compound distribution and also assures a dry, non-greasy surface texture. Other uses for the new resin include decorative and protective metal coatings and hot and cold dip compounds. Metal coating based on Pliovic VO are easily spread or spray-applied, while small additions of Pliovic AO furnish excellent pick-up properties to dipping compounds. Pliovic VO now is available on a commercial scale, and is packaged in 50-pound multi-wall bags according to officials of the Goodyear Chemical Division.

ISO Approves Draft On Rubber Hardness Standard

► An international standard for the determination of hardness of vulcanized and synthetic rubber has been approved as a draft recommendation by representatives of the International Organization for Standardization. Designated ISO Recommendation R48, it is available in the United States from the American Standards Association, 70 East 45th St., New York 17, N. Y. This recommendation has been incorporated by the American Society for Testing Materials in ASTM standard D-1415-56T, Tentative Method for Test for International Standard Hardness of Vulcanized Natural and Synthetic Rubbers. The standard hardness test in the ISO recommendation is based on measurement of the penetration of a rigid ball into the rubber test piece under specified conditions. The measured penetration is converted into International Rubber Hardness Degrees.

Earlier Draft Revised

The new recommendation represents a revision of an earlier draft which was modified in line with suggestions presented by the U.S. and other nations. U.S. interests are represented on ISO Technical Committee 45 on Rubber by an American group acting through the A.S.A. Responsibility for the organization of the American group and for the technical participation in the ISO committee is held by committee D-11 of the ASTM. A.S.A., a federation of 116 trade and professional associations, is the U. S. clearinghouse for national standards. As the U. S. member body of the ISO, the A.S.A. provides the means by which American industry and other groups can cooperate with the other countries in the international standardization program. ISO provides the organizational facilities for the development of international industrial and commercial standards. National Standards bodies of 40 nations are presently ISO members.

New Cable Sealant Developed

► Silicones Division of the Union Carbide Corp., New York, N. Y., has introduced "Union Carbide K-1999 Silicone Cable Sealant" for use in cable produced to meet MIL-C-19381A Special Purpose Electrical Cable (Nuclear Plant) Specification. K-1999 can be easily pumped with conventional sealant handling equipment while still passing the drip test specified in MIL-C-19381A. It has a remarkably stable consistency when subjected to extreme temperatures, retaining its effectiveness in the range of —60° to +500°F. K-1999 remains in place without the need of physical confinement and requires no heat curing. The material is a heavy grease compound with an off white color and a specific gravity of 1.66±0.06, William Plasticity of 1.60±40 (both measured after four days of bin-aging without remilling sample), and a flash point (COC) of >340°F.

Clinic on Sales Management Features Annual Meeting of RMA Mechanical Goods Group

► A Sales Management Clinic featured the annual meeting of the Molded, Extruded, Lathe Cut and Sponge Rubber (Chemically Blown) Products Subdivision of the Mechanical Rubber Goods Division of the Rubber Manufacturers Association, Inc. Held at the Hotel Astor in New York City on June 17, the meeting attracted approximately 55 members. This meeting was originally scheduled to be held at The Homestead in Hot Springs, Va., where it is usually held over a two-day period.

In addition to the Sales Management Clinic, which covered five specific topics, several talks on a variety of subjects were also included. The latter were presented at the afternoon session, following a social period and luncheon. The day's activities were concluded with a reception and light buffet held in the hotel. It was generally agreed that the meeting stimulated a good deal of thought.

The morning session was devoted to the Sales Management Clinic which got under way after a brief welcoming address from W. J. Blizzard (Firestone Industrial Products), chairman of the subdivision. The first panel, moderated by K. N. Carter (H. O. Canfield), was devoted to "Field Salesmens' Reports to Management." The panelists included M. J. Katis (Dryden Rubber), E. F. Doe (Pawling Rubber) and Davis Lewis (Vulcanized Rubber & Plastics).

Monthly Reports Urged

A survey made in connection with the planned program indicated that rubber manufacturers were receiving daily, weekly and monthly sales reports from their sales people. The point was made that companies should insist on the monthly reports, over and above all others, because these reports are usually written in a more relaxed atmosphere and enable the salesman to review his own efforts. Sales managers were urged to utilize Lost Order Reports as reports of this type give management a good deal of information and help to point out trends. Customer complaints came in for discussion and one company pointed out its use of red borders around such complaints in order to lend emphasis.

The second panel was in reverse order to the first, namely, "Managements Reports to Field Salesmen." This panel was moderated by D. S. Watkins (Chardon Rubber) and included H. C. Sommer (General Tire), R. V. Yohe (Goodrich Industrial Products) and H. C. Dinmore (Tyer Rubber). In opening the panel, Mr. Watkins emphasized the fact that a well-informed salesman is a good salesman.

The discussion brought out the fact that most rubber companies supply their salesmen with daily shipping information. It was agreed that blueprints should be furnished to salesmen where quotations are involved but the need for good reproduction systems was apparent. The survey indicated that most mechanical goods producers hold sales meetings on an annual basis only, and it was suggested that more frequent meetings were in order. It was generally agreed that telephone communication with the sales force is imperative. On the subject of sales quotas, it was agreed that such quotas should be set but that a realistic attitude should be maintained in setting them. The danger of the "Cloud 9" approach was emphasized.

"Sales Methods" were covered in the third panel, moderated by R. C. Kremer (Ohio Rubber). The discussion revealed that some eight different sales methods are used in the mechanical goods field, but most companies utilize a combination of manufacturers representatives and salaried or commission salesmen. Some companies use only either salaried and commission salesmen and several companies operate completely through manufacturers representatives. It was generally agreed that the maintenance of exclusive territories was difficult and frequently commissions had to be split because cross coverage was involved.

One conclusion reached as a result of this discussion on sales methods is that the method of selling cannot be fixed. It must be flexible to meet the changing times, because what was effective selling ten years ago may be an impossible approach today. Panelists on the subject included R. H. Davis (Cooper Tire), E. W. Wright (Goodrich) and Anton Rizzardi (Yale Rubber).

W. J. Blizzard

The subject of "Entertainment Expenses" was covered in the fourth panel discussion, this one moderated by Pierce Sperry (Sperry Rubber & Plastics) and including R. D. Smith (Firestone Industrial Products), R. G. Cox (Goodrich) and Eugene Caillet (Goodyear). It was agreed that no hard and fast rules can apply where entertainment by salesmen is concerned but that budget control of some kind is advisable. It was suggested that even convention expenses be covered by budget.

Reference was made to the trend in recent years towards the elimination of Christmas gifts. It was emphasized that customers realize that the cost of such gifts is reflected in the prices of the products they purchase. One of the participants stated that his company had eliminated all such gifts without any resulting loss in sales. Another stated that his company gives such gifts but restricts them to items of nominal value of their own manufacture. The survey indicated that companies still providing gifts permitted amounts ranging from $5.00 to $200.00.

Mr. Blizzard, subdivision chairman, moderated the next panel. It was devoted to "Other Controllable Expenses" and the panelists were H. M. Dyer (Acushnet Process) and E. F. Callanan (Clevite Harris Products). During this discussion it was brought out that most companies require hotel receipts from their salesmen, automobile mileage rates paid run from 7 to 8 cents per mile, and preference for cars by sales people are for Chevrolets, Fords and Plymouths, in that order.

A good deal of the discussion was on telephone expenses. Many of the company members present indicated that they have leased wires to metropolitan areas. The majority try to control the number of long distance calls with varying success. It was agreed that some effort should be made to control the length of long distance calls and one company revealed that it uses a buzzing device to call attention to overlong calls.

Varied Topics in Late Session

As indicated, the afternoon session included a number of talks on a variety of subjects. The first speaker was J. D. Mahoney, Vice President of Sales, Mobay Chemical Co., who discussed "The Future Application of Urethane." After outlining the history of the urethanes, Mr. Mahoney predicted that Vulkollan, the tough urethane now coming into the commercial market picture, will soon make conventional design methods of metal parts obsolete.

Revealing, for the first time, tests on some Vulkollan products, Mr. Mahoney detailed results on several unusual applications. Among these was a lining for a pump housing used in the oil industry. Formerly made of cast iron, the housing had to be replaced after each 350 hours of operation. An oil pump housing made of urethane rubber is still in satisfactory condition after 3,000 hours on the same job. He pointed out that size of parts

E. Lee Martin

presented no special difficulty to urethane rubber and items up to 40 pounds in weight have already been cast.

An optimistic note on the national economy was sounded by Robert A. Kavesh, business economist of the Chase Manhattan Bank in a "Report on the National Economic Outlook." Pointing out that recessions are almost inevitable in our type of economy, he emphatically stated that the bottom had been reached in the present recession and that Labor Day will be the turning point for a new advance.

Mr. Kavesh further predicted that a new all-time industrial peak will be reached during 1960 but that another recession might be expected a year or two thereafter. According to the speaker, inventories in general are at an exceedingly low ebb and efforts to rebuild them will be made shortly. He also stated that, in his opinion, competition will soon force an upward turn in capital expenditures, the reduction in which has contributed substantially to present economic conditions.

Other talks at the afternoon session included "The Effect of Anti-Trust Laws and F.T.C. on Trade Association Activities," by Eugene Z. DuBose, partner, Alexander & Green; "Current Status of Labor-Management Discussions," by E. Lee Martin, secretary of the RMA Manufacturing Committee, and "Current Status of and Future Potential of the Rubber Shippers' Association, Inc.," by C. W. Halligan, RMA treasurer. Mr. Martin predicted that negotiations between rubber manufacturers and the U.R.W. will probably lag until a settlement of some kind is reached in the automotive field.

Other Activities at Meeting

The speaker at the luncheon session was James Goss, Vice-President of Consumers Products, General Electric Co. Taking as his theme "Management's Responsibilities in the Control of Expenses," Mr. Goss stated that there was an urgent need to impart proprietary interest to management teams. In his belief the current crop of executives needs maturity because the demand on management is so much greater these days than in the past. The speaker emphasized that business is people and more attention should be paid to training executives and eliminating "deadwood" where it exists in the corporate structure.

J. D. Mahoney

Some discussion was held during the luncheon session on the compilation and reception of the new RMA Rubber Handbook. A special tribute was paid to Mr. Dinmore for his efforts in this instance. An on-the-spot survey made at the meeting indicated that sales of the mechanical goods producers present were off from 5 to 55%. The weighted average was approximately 24%.

Insulation Conference Planned

► Sponsored by the American Institute of Electrical Engineers and the National Electrical Manufacturers Association, the First National Conference on the Application of Electrical Insulation is scheduled to be held in Cleveland, Ohio on September 3, 4, and 5. The program for this conference, which is the first of its type to be held in the United States, was arranged during a meeting of the Conference Committee members at NEMA headquarters in New York, N. Y. J. R. Perkins (DuPont) has been appointed chairman of the conference and H. H. Chapman, Jr. (Owens-Corning-Fiberglas) has been designated program chairman.

Anthony J. Celebrezze, the mayor of Cleveland, has been chosen as one of the luncheon speakers to officially welcome those attending the conference. Other luncheon speakers include W. V. O'Brien, NEMA president, and L. F. Hickernell, president of AIEE. Dr. L. J. Berberich (Westinghouse Electric) has been scheduled to speak at the dinner meeting of the AIEE Dielectrics Committee on September 3. The organizing committee decided to hold concurrent sessions during the conference with topics divided according to equipment category — rotating equipment, transformers, controls and instrumentation, and electronics.

The morning sessions of the conference will consist of papers delivered by representatives of electrical insulating materials manufacturers. Presentations in the afternoon sessions will be made by electrical equipment manufacturers. An additional feature of the conference will be commercial and technical exhibits by the insulation and equipment manufacturers, which will illustrate topics dealt with in the conference sessions.

Adopts New Type Packaging

► Silicones Division of the Union Carbide Corp., New York, N. Y., has adopted a new square standard shipping box for all silicone rubber compounds made at the Long Reach, West Va., plant. The box is a flat fiberboard container and comes in sizes 16 x 16 x 3 and 16 x 16 x 6 inches. The smaller container ships 25 pounds of compound wrapped in polyethylene, while the larger box is used to ship 50 pounds in two 25 pound, polyethylene wrapped packages. Formerly, fiberboard drums were used. The company states that the new flat cartons are durable, convenient, easy to handle, light in weight and protect the product. Because compounds are packaged in polyethylene, the risk of contamination is reduced and since the packages weigh 25 pounds, unused portions are relatively small and protected when re-wrapped.

Elliot Inflatable Life Raft

► The "Elliot Inflatable Life Raft", manufactured by Cory Brothers & Co., Ltd., England, was recently demonstrated to officers of the Military Sea Transportation Service and shipping industry officials at the Brooklyn Army Terminal in New York. The six-seat raft is rolled up and packed in a valise-like container and can be put overboard by two men. A small manila line extending from the pack is kept tied to a fixture on the ship. When the raft is waterborne, a pull on this line opens the craft, and starts inflation of the rubberized compartments.

In operation, the emergency vessel has a tent-like covering that can be closed and which is kept taut by "air arches" strong enough to take the weight of a man jumping from the deck. The tight covering provides shelter and keeps the raft warm enough to protect occupants in cold weather. A raft for a merchant ship, for twenty-five men, is 16 feet long and more than four feet high to the top of the shelter. It packs in a bundle 54 inches long and weighs 228 pounds. An emergency pack is also provided, which holds rations, water flares, etc., and which weighs 164 pounds. The six-man raft weighs 79 pounds and the pack weighs 55 pounds. Current reports state that the raft will soon be produced in this country by the Survival Equipment Corp., Monterey, Calif.

ASME Rubber Division Meets

June 17th meeting features morning and afternoon technical sessions covering wide range of subjects

► The Rubber and Plastics Division of the American Society of Mechanical Engineers met on June 17 at the Statler Hilton Hotel in Detroit, Mich., in conjunction with the Semi-Annual Meeting of the parent society which was held on June 15 through 19. The Rubber and Plastics Division meeting featured both morning and afternoon technical sessions. F. J. Wehmer (Minnesota Mining) served as chairman of the technical sessions.

D. F. Redman (Dow Chemical) opened the morning technical session with a paper entitled "Expandable Polystyrene-Applications and Fabrication." Mr. Redman said that expandable polystyrene has found application in several major fields, including insulation, structural material, buoyancy, display (novelty and floral), packaging, electrical and low-density filler. He also discussed coloring and fabrication methods, using charts and illustrations. Expandable polystyrene, he said, is enjoying considerable success in the field and its applications have increased each year. He felt also that many more new applications could be found in which this material could be utilized to advantage.

E. R. Dye and M. D. Smith (Cornell Aeronautical Laboratory), next presented a paper entitled "The Mechanical Properties of Low Density Plastic Foams as Energy Absorbers".

Discusses Urethane Properties

The following paper, entitled "The Engineering Properties of Rigid and Semi-Rigid Polyurethane Foams," by J. M. Margedant (DuPont) stated that urethane foams are finding their way into widespread use because they lend themselves readily to variation of formulation, and hence, to variation in properties of the final foamed product. In essence, he said, the product can be tailor-made to the consumers' needs.

Outlined in the paper was a brief description of what a urethane foam is, its range of properties and how it can be physically handled or applied in commercial production. Mr. Margedant also discussed the market in which urethane is being used and what is expected of the material in the future.

"Rigid Plastic Foams", which was written by M. H. Nickerson, was presented by H. S. Schnitzer (DeBell & Richardson). Mr. Schnitzer said that epoxy resin foams are a relatively new class of rigid material on the market. The foams were described as lightweight, strong, and uniform, offering interesting uses in the tooling industry, particularly as checking fixtures, because of their excellent dimensional stability.

The author stated that these are readily machined or cut with conventional tools to close dimensions, and are available as large blocks, thus facilitating construction of large fixtures. Thermoset by nature, they are unaffected by moderately elevated temperatures or solvents and have very low water absorption, which contributes to their dimensional stability.

Mr. Schnitzer stated that the ability of these materials to remain tough and resilient at elevated temperatures (around 300°F.) suggests some interesting uses involving post-forming of the material. When heated to 300°F., he said, the foam structure can be readily formed, molded or compressed, and if cooled in that condition remains "frozen" in place. On reheating the compressed material to 300°F., the foam re-expands to its original dimensions and retains essentially all of its original strength, the author said.

The last paper to be presented during the morning session was "Development of Sandwich Construction Refrigerator Cabinets", delivered by F. R. Marshall (Westinghouse Electric). Mr. Marshall stated that the use of sandwich panels for construction refrigerators offers the manufacturer an opportunity to experiment the market for completely different types of refrigerators. Utilization of tooling costing less than 20 per cent of the cost of tooling on a conventional refrigerator is making it possible for the sandwich cabinet to compete with conventional type refrigerators in small quantity production.

Use of Metal Skins

According to Mr. Marshall, the use of metal skins, both aluminum and steel in place of the original all plastic construction, is proving practical in development stages. Expanded polystyrene bead foam in 1 to 1½ lb./cu. ft. density, because of its relatively low cost and its thermal conductivity in the same range as glass fiber insulation now in use, appears to be the logical choice for insulation in the sandwich panel. In addition, he said, it satisfies the requirements of strength, low water absorption, low water vapor transmission and other requirements for use as insulation in a sandwich panel for a refrigerator cabinet.

The cost picture, Mr. Marshall pointed out, looks considerably improved due to the use of metals and the easier to apply, less costly adhesive materials. He felt that future growth of this type of construction is largely dependent on improved cost of both materials and manufacturing techniques.

"Designing with Rigid Polyvinyl Chloride", by M. Batiuk and J. A. Rolls (Goodrich Chemical), was the first paper to be delivered during the afternoon session. The paper described typical normal and high impact rigid polyvinyl chloride compounds in terms of basic physical and chemical properties. Processing and fabrication techniques were discussed to serve as a guide in the use of rigid polyvinyl chloride. Product applications were also described to demonstrate how the properties of these materials can be used to best advantage.

George M. Konkle (Dow Corning), in a paper entitled "New Developments in Silicone Rubber", discussed newly developed types of silicone rubber. According to Mr. Konkle, airplane tires immune to heat generated in supersonic flight are now being made of a new kind of synthetic rubber which has three times the tensile strength and four times the elongation of the first varieties of silicone rubber. Silicone rubber, Mr. Konkle said, can be molded and extruded on the same kind of equipment used for natural rubber and "the finished product looks and feels like any other type of rubber."

Cites Heat Resistance

The author added that silicone rubber has a number of unusual properties, the most important of which is resistance to heat. It can be exposed to temperatures of 300° to 400°F. for limited periods, while still retaining its strength. It also resists cold and may be used at temperatures as low as —166°F. According to Mr. Konkle, other desirable qualities of silicone rubber include toughness and resistance to oil and chemical attack.

"Solid Urethane—A New Method of Construction," was presented by Kenneth A. Pigott (Mobay Chemical). He described a new plastic material, commercially known as "Vulkollan", which has the desirable properties of rubber, nylon and steel. Mr. Pigott stated that "Vulkollan" combines "hardness, strength, rigidity, resilience, elasticity, load carrying, abrasion resistance, oil resistance and oxygen or ozone resistance as no other material has ever done before."

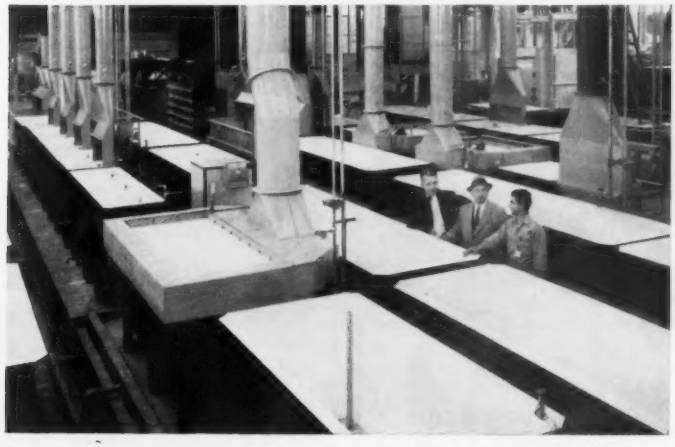
Some applications suggested for the material were handles for air hammers like those used to tear up pavement and solid tires for industrial trucks. In actual use, the speaker said, Vulkollan will resist abrasion ten times better than good natural rubber. He added that the new plastic had been used in Germany to make motorcycle sprocket gears. Such gears, he said, have lasted for over 60,000 miles of operation with no appreciable sign of wear. The author concluded by saying that the new material has found wide usage in European markets for several years but has been introduced in this country only recently.

E. W. Cronin (Hercules Powder), pre-

sented the last paper which was entitled "Polypropylene, Engineering Properties and Applications of." The paper discussed a new commercial plastic, Hercules polypropylene which was said to show potential of becoming the "workhorse" of the plastics industry. The new material, called "Pro-fax" polypropylene has been commercially produced by Hercules for only five months, but is already being used in a broad range of molded products including women's shoe heels, industrial valves, hospitalware, plumbing fixtures, eletrical parts and automotive fixtures.

Mr. Cronin said that Pro-fax has been formed without difficulty into injection molded parts, extruded shapes and pipes, extruded film and drawn sheet, and into mono- and multifilaments. It yields parts of high gloss, excellent chemical resistance and is completely resistant to stress cracking."

Other potential applications suggested by development work, Mr. Cronin said, include tarpaulins, woven hose, woven fabrics, rope; clear high strength films for industrial tapes and packaging material; refrigerator linings and dishwasher covers from sheet stocks; piping, bottles, wire and cable coatings and other applications in the electrical field. The heat-distortion value of Pro-fax was cited as probably one of its most important properties.



► Tons of Koroseal polyvinyl chloride material protect the world's largest aircraft plating plant that went into production recently at McClellan Air Force Base, Sacramento, Calif. Koroseal sheathes the plant tank lining and duct work against corrosive plating solutions and fumes that eat away metal. The new plant will plate and anodize engine parts, landing gear, tubing, electronic parts, communication equipment, fuel cells and wing tanks for several types of jet aircraft. Plating solutions to be used include copper, chrome, brass and such fine metals as rhodium, indium, silver and gold. New England Lead Burning Co. of San Leandro, Calif., lined and covered 135 tanks with the flexible Koroseal tank lining sheet. The necessary hoods and ducts were fabricated from high impact rigid Koroseal.

OTS Releases Three New Polymer Research Reports

► Three reports of research conducted under the Air Force program of synthesis and evaluation of new polymers have been released through the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. The first, *Development of Fluoro-Silicone Elastomers, Part 3*, by G. W. Dyckes, Peninsular Chemresearch, Inc., for Wright Air Development Center, U. S. Air Force, discusses some promising fluoroalkyl silane monomers and polymers which were prepared for use as high temperature and aircraft fuel-resistant elastomeric materials. The 63 page volume, Order PB 131425, was published in September 1957 and is priced at $1.75. The second report, PB 131715, is entitled *Development of Thermally Stable Silicon Containing Resins, Part 2*. Prepared by L. W. Breed, F. Baiocchi, and C. C. Bolze, Midwest Research Institute for the Wright Air Development Center, U. S. Air Force, this 76 page study is devoted to a discussion of the preparation of laminates from experimental monomers and also presents results of work on synthesis of monomers. Published in February 1958, it is priced at $2. The last report is *Coordination Polymers, Part 2*, by W. C. Fernelius and others, the Pennsylvania State University for Wright Air Development Center, U. S. Air Force. A conclusion of this study was that although coordination polymers can be prepared, the problem of getting polymers of truly high molecular weight still remains unsolved. Order PB 131649, a 71 page volume published in December 1957, is priced at $2.

URW Reaches Agreement on 3.1% Wage Boost Pattern

► A pattern-setting agreement for a 3.1 percent boost in wages has been reached by the A.F.L.-C.I.O. United Rubbers Workers Union with Goodyear Tire & Rubber Co. and B. F. Goodrich Co., but prices of tires and other rubber products are not expected to rise at least until fall. The wage agreement was reached just prior to a midnight deadline July 1. The boosts are effective June 30.

In recent years, tire companies have raised tire prices soon after signing new wage pacts with the union. Last year, prices went up 3%. But a number of tire sales executives expressed doubt that prices will rise soon this time, due to competitive conditions in the industry. A general improvement in business is expected later this year.

The wage agreement called for an eight-cent hourly, across-the-board pay boost for 20,000 Goodyear union workers and 13,000 at Goodrich plants. This brought the average straight time hourly wage of Goodyear and Goodrich workers to $2.59. The settlement was in line with private guesses made earlier.

The union made at least one major concession, agreeing to defer negotiations for improvements in pension and insurance benefits until early next year. Master contracts for the companies run out April 15, 1959, but they contain provisions for annual reopening for wage talks, which usually come in the summer.

Cite Low Tire Profits

While tire makers still complain that their profit margins on tires are undesirably low, they note on the average materials costs in the past year have dropped slightly. Tire cord and natural rubber are two major items that are down a bit.

Shipments of passenger and truck tires in the first five months this year were down about 13% from last year. In the big passenger tire market, all the drop is due to a sharp decline in shipments to the depressed auto industry. Replacement passenger tire sales are actually running slightly ahead of last year.

The wage settlement came after only two days of bargaining over specific offers and demands. Until June 30, the companies had made no offer, which was indicative of their balky mood this year. The union had made no specific demands. Finally on June 30, one of the rubber companies came forth with an offer of a four-cent hourly pay boost, it was learned. The union quickly rejected that and finally settled on the eight-cent figure.

That was little more than half the size of last year's hefty settlement of 15 cents —or a 6% increase—which was the largest won by the U.R.W. since 1946. This year's settlement is the smallest since recession year 1954, when the union signed up for a 6½-cent hourly boost.

The Goodyear and Goodrich settlements are expected to bring quick agreements between the union and other rubber firms. Negotiations are currently under way with Firestone Tire & Rubber Co. and United States Rubber Co. Talks with smaller firms in the industry will follow.

CIC Rubber Division Holds Annual Meeting in Toronto

► The Division of Rubber Chemistry of the Chemical Institute of Canada held its Annual Meeting on May 28 at the Royal York Hotel in Toronto, Ont., Canada, in conjunction with the 41st Annual Conference and Exhibition of the parent society which was held from May 26 through 28. The Rubber Division meeting featured both morning and afternoon technical sessions and a luncheon session which was addressed by L. T. Rosser, president and general manager of Mansfield Rubber (Canada), Ltd.

In his talk on "Economics of the Canadian Rubber Industry," Mr. Rosser outlined the manner in which Mansfield Rubber was formed, the markets it now has and the goals to which the company aspires. The speaker emphasized the many opportunities which still exist for all in the rubber industry. His talk was spiced with several amusing anecdotes.

At a brief business session, the following persons were elected to office for the 1958-59 season: *Chairman*, J. A. Carr (Dunlop); *Vice-Chairman*, W. H. Nechtel (Kaufman Rubber); *Secretary-Treasurer*, J. L. MacDonald (H. L. Blachford). The following members were elected to the Executive Committee: A. Jaychuk (Goodyear), H. Hencher (H. L. Blachford), D. Hay (Polymer). R. Tartaglia (Goodyear) was named representative from the Ontario Rubber Section.

Morning and Afternoon Sessions

Both morning and afternoon technical sessions were attended by some sixty members and guests. Wray Cline (Canadian General-Tower) served as chairman of the morning session while Wilf Jonah (Louis Specialties) served as chairman of the afternoon session. Abstracts of the papers presented at both sessions appeared in the April, 1958, issue of this journal. The papers and their authors follow:

"Factors Influencing Cut Growth Testing" by W. A. Gurney and I. C. Cheetham, Dunlop Research Center, Birmingham, England.

"Studies of Synthetic Polymers with the Electron Microscope" by W. Rupar and L. Breitman, Polymer Corp. Ltd., Sarnia, Ont.

"Effects of Radiation on Raw and Vulcanized Elastomers" by T. C. Gregson, W. R. Miller, L. B. Bange, and S. D. Gehman, Goodyear Tire & Rubber Co., Akron, Ohio.

"Some Studies on the Dispersion of Carbon Black in Rubber" by C. W. Sweitzer, W. M. Hess, and J. E. Callan, Columbian Carbon Co., New York, N. Y.

"Recent Advances in Rayon Tire Yarn" by A. Sandig, Courtaulds (Canada) Ltd., Montreal, Que.

"Factors Affecting the Physical Properties of Furnace Black/Butyl Rubber Vulcanizates" by D. F. Walker, E. M. Dannenberg and B. B. Boonstra, Godfrey L. Cabot, Inc., Cambridge, Mass.

"Lignin-Rubber Technology" by D. W. MacGregor, L. H. Krichew and T. R. Griffith, National Research Council, Ottawa, Ont.

"Maleic Anhydride Modified Elastomers" H. W. Pacton, R. H. Snyder, P. F. Gunberg, and P. O. Tawney, U. S. Rubber Co., Wayne, N. J.

"The Pneumatic Tire—Yesterday and Tomorrow" by James E. Corey, Firestone Tire & Rubber Co., Akron, Ohio.

Many companies dealing with the rubber industry were represented at the Exhibition which was held in conjunction with the 41st Conference. Among these companies were the following: Atlas Powder Co. of Canada, J. T. Baker Chemical Co., Blue M Electric Co., Canadian Industries Ltd., Canadian Johns-Manville Co. Ltd., Carbide Chemicals Co., Chemical Institute of Canada, Commercial Solvents Corp., Corning Glass Works, Cyanamid of Canada Ltd., Dow Chemical of Canada Ltd., DuPont Co. of Canada (1956) Ltd., Linde Air Products Co., Merck & Co. Ltd., and Shell Oil Co. of Canada Ltd.

Extruding Heavy Gauge PVC

► First successful extrusion of vinyl in the form of wide, heavy gauge sheeting with exceptionally close tolerances has been jointly announced by National Rubber Machinery Co., Akron, Ohio, and the B. F. Goodrich Chemical Co., Cleveland, Ohio. The material extruded was "Geon 8700A" supplied by Goodrich. Other vinyl copolymers and plasticized materials have since been extruded. Experimental work at the N.R.M. laboratory produced a 52-inch wide sheet of rigid unplasticized vinyl 130 mils thick with a tolerance of plus or minus 4 mils. The continuous length extrusion was made possible through the development by N.R.M. of a new flat type sheet die. The fast but precise new method is expected to reduce costs of a fraction of those previously experienced. Company officials say that the new technique will be of particular value in producing material for tanks, ductwork, tank lining, refrigerator door lining and for other end products involving vacuum forming.

W. T. Davis

A. W. Swartz

Linear Announces Election of Swartz and Davis

► Linear Inc., Philadelphia, Penna., has announced the election of A. W. Swartz, Jr., as executive vice-president and W. T. Davis as vice-president in charge of manufacturing. Mr. Swartz, who has been associated with the company for 20 years, was previously vice-president in charge of operations. Mr. Davis, formerly a vice-president of the Sun Rubber Co., joined Linear in 1956.

Three Sydney L. Albert Companies Sued for $1.9 Million

► Three corporations belonging to Sydney L. Albert, Akron financier, have been sued for $1,914,900 in a foreclosure action brought by the Harry Herskowitz Foundation, Inc., described as a non-profit, New York charitable corporation. The firms named in the suit are Machinery Terminals, Inc., Albert & Son Machinery Corp. and Bellanca Corp. Mr. Albert, a top officer in each, was not himself named a defendant. Current reports state that the suit was aimed at collecting the money or foreclosing on Mr. Albert's property at 258 Kenmore Blvd., Akron, Ohio, home office of the corporate defendants. The Foundation said the $1,914,900 is the unpaid balance plus 5 per cent interest on a 1953 loan of $2,000,000 to Machinery Terminals. Four non-Albert companies, named as either tenants or holders of the easements on the property, and the city were also made defendants. The action was to have had a first hearing on Friday, June 27.

ODM Revises Stockpile Policy From Five to Three-Year Plan

► Office of Defense Mobilization has revised its policy for stockpiling strategic and critical materials, cutting down stockpile supplies to a quantity that will meet deficits of three years' duration, after an intensive review of the role of stockpiling in defense mobilization. Stockpiling since World War II, had been for a five-year emergency. Effective June 30, the revised policy contained in Defense Mobilization Order V-7, called for the establishment of "basic" and "maximum" goals for each material.

The basic objective partially discounts overseas sources of supply, while the maximum objective assumes no dependence on sources beyond North America and comparably accessible areas. In determining the two objectives, consideration will be given to the vulnerability of supply sources where they are excessively concentrated.

Other provisions of the new order are: (1) Materials now on hand which do not meet specifications may be processed to stockpile standards within the limits of maximum objectives when this can be accomplished at less cost to the government than the purchase of new specification grade materials; (2) In order to meet the initial impact of intensive mobilization, materials may be processed, in some cases, to readily usable forms in amounts generally equivalent to a six-months' requirement, unless an interagency review indicates the need for a larger or smaller amount; (3) Close observation will be maintained for use of materials having high temperature or other special properties to ensure that shortages do not develop as a result of rapidly changing technology.

Also, (4) Contracts for materials in excess of maximum objectives shall be cancelled when this can be accomplished by mutual consent of the suppliers and the government; (5) Stockpile information will be declassified by ODM when it determines, with the concurrence of agencies concerned, that disclosure will not jeopardize the national security.

Reorganizes Barrett Division

► Allied Chemical Corp., New York, N. Y., has announced plans to create two separate divisions to manufacture and market the product lines now handled by the Barrett Division. Roofing, building and paving materials will continue to be manufactured and sold by Barrett, under H. Dorn Stewart as president. Mr. Stewart, formerly with Armstrong Cork Co., joined Allied in April as assistant to the executive vice-president. The manufacture and sale of plastics, resins and industrial chemicals, now handled by Barrett, will be conducted by the Plastics and Coal Chemicals Division, with T. J. Kinsella, head of Barrett since 1952, as president. It is believed that this change will make possible intensified concentration on research, customer service and the development of specialized markets for each of the product lines involved.

William C. Zekan

Dudley G. Brattin

Schulman Promotes Zekan and Brattin

► William C. Zekan has been appointed executive vice-president and Dudley G. Brattin has been named treasurer and comptroller of A. Schulman, Inc., Akron, Ohio. Mr. Zekan, who became associated with the firm in 1937 as an office and sample boy, has acquired a thorough knowledge of all phases of the Schulman organization since that time. His assignments within the firm have included working in international operations and in the New York office. At the age of 36, he was named vice-president and director of the company. A veteran of World War II, Mr. Zekan resides in Akron with his wife and children. Mr. Brattin started in the Accounting Department with Schulman in 1946. He was formerly assistant comptroller and assistant treasurer before being appointed to his present position. Mr. Brattin is also a resident of the city of Akron.

Richardson Scale Promotions

► Richardson Scale Co., Clifton, N. J., has appointed John K. Rudd manager of the Custom Products Division; William R. Runo manager of the Standard Products Division, and Samuel M. Dix as manager of the Resale Products Division. Mr. Rudd has been chief applications engineer for the past three years. In his new post, he will be responsible for the application of Richardson equipment to new or special customer requests. Mr. Runo, formerly materials testing engineer in the Engineering Department, will direct the promotion and coordination of the company's standard product lines. Mr. Dix, who was formerly in the Sales Department, will head the newly-organized Resale Products Division, through which accessories are selected as components of Richardson systems.

Named Goodrich Vice-President

► John C. MacKinnon, formerly general sales manager of footwear and gloves, has been appointed vice-president of sales for the Footwear and Flooring Division of the B. F. Goodrich Tire and Rubber Co., Akron, Ohio, succeeding James S. Barrie, who has retired. Associated with the Hood Rubber Co. for 29 years, Mr. MacKinnon will be responsible for products bearing both the Goodrich and the Hood Rubber brand names.

Plastics Group Visits U.S.S.R.

► A delegation of U.S.A. plastics manufacturers visited the Soviet Union during June as part of a cultural, technical and educational exchange team that was provided for in a joint U.S.S.R.-U.S.A. agreement which was signed in January of this year. The arrangement specifically provided for a team to be composed of plastics manufacturers. Officials of the Society of the Plastics Industry, Inc., stated that while many plastics were developed in the United States, a number were developed abroad, and it is important to keep abreast of foreign plastics research and development. With a vast team of over 250,000 scientists and with over 70,000 more being added annually from the school system, the chances are very good that the Soviets will make a contribution to further plastics developments. Participants on both sides will benefit from this exchange which should moreover make its contribution to bringing about a broader and better mutual understanding, SPI declared. The U. S. delegation arrived in Moscow on June 2nd and remained in Russia for thirty days for a comprehensive tour of the U.S.S.R. plastics industry. The Soviet delegation will come to the U.S.A. for a similar period in November. While here, the delegates will attend the Eighth National Plastics Exposition in Chicago, Ill., November 17-21.

FTC Issues Tire Advertising Guide

Agency Seeks to End Confusion Over Misleading Terms and Claims

► Twelve guides aimed at ending public confusion over the meaning of advertising terms for automobile and truck tires have been issued by the Federal Trade Commission, Washington, D. C. The guides call for tire makers and dealers to advertise and label tires so that the buyer will not be misled as to the quality and safety of any brand of tire. In issuing the guides, which become effective August 27, the FTC initiated a new type of voluntary law enforcement. The guides give the tire manufacturing industry detailed notice of what the FTC considers illegal about the advertising of that industry's product. A violation of these guides could lead to a formal complaint, charging violation of the FTC Act. Heretofore, the agency has relied entirely on voluntary compliance with its guides, which are issued as a regular part of its policing of industry.

The new tire guides, to be administered by FTC's Bureau of Consultation, will continue to deal cooperatively with members of the tire industry to get voluntary compliance of the law. However, the commission's investigation staff also was directed to keep the industry under surveillance. "The commission wants to show it means business," one official said. "Our policy is to back up the voluntary work with hard-hitting enforcement." FTC Chairman John W. Gwynne said the new procedure permits the commission to set forth for the guidance of all concerned what it believes the law "requires for the protection of competition and the public interest."

Interested Parties Consulted

Proceedings to initiate the establishment of tire buying guides were begun last November when the FTC mailed proposed guides to all known interested parties. Comments on the proposed guides were requested and the FTC said all comments and suggestions received were given careful consideration in the light of applicable legal precedents. The finished 12-part guide was published at the end of May which will allow tire makers and merchandisers 90-days to become acquainted and to comply with the new rules. The guides outlaw deceptive grade designation, pricing policies, guarantees, safety claims, and other practices that would mislead the public. A summary of the guides follows.

(1) *Standards of Construction*—A tire advertised as "first line" must be the particular manufacturer's—or brand name distributor's—best tires, exclusive of his premium quality products that embody special features. Terms such as "100 level" and "120 level" must be accompanied by a clear and truthful explanation of what they mean.

(2) *Deceptive Designations*—If a manufacturer's "first line" tire is designated as "standard," his "second line" tire must not be designated "super standard" or any other misleading term.

(3) *Original Equipment*—This designation may be given only to tires generally used as original equipment on American-made current new model cars.

(4) *Plies*—Tires must not be described as having more than their actual number of plies. Advertising which uses "6 ply rating" or "8 ply rating" to describe passenger car tires must not only be truthful in describing the strength of the tires but also must disclose any lesser number of plies, and should contain the identity of the ply fabric, and also whether such tires require tubes.

(5) *Used Products*—Unexplained terms, such as "New Tread" or "Snow Tread" to describe used tires are not adequate to disclose when such are not new.

Terms Must Be Explicit

(6) *Change Overs, New Car Take Offs*—Such terms may be used only to describe tires that have been given insignificant use in delivering a new vehicle to its purchaser. Advertising must state conspicuously that they have been used.

(7) *Disclosure that Products are Obsolete or Discontinued Models*—When this is true, advertisement must conspicuously disclose the fact.

(8) *Prices*—Advertised prices of tires should be the actual selling price and should not be any higher than those at which the tire regularly sells in the market area.

(9) *Guarantees* — Advertisements for "lifetime guaranteed" tires must contain a clear definition of what is meant by "lifetime."

(10) *Blemished, Imperfect, Defective, Etc., Products*—Such imperfections must be disclosed in advertising and a marking whose meaning is understandable to the public must be permanently stamped to both tires and wrappings.

(11) *Safety or Performance features*—Terms like "skid proof," "blowout proof" and "puncture proof" may not be used unless the tire affords absolute protection from the implied danger under any and all driving conditions.

(12) *Other Claims and Representations*—No advertising claim shall be made which deceives customers in any material respect—directly, by implication, or by failure to disclose relevant information.

New York Holds Outing

► More than 200 members and guests of the New York Rubber Group attended the Annual Summer Outing held on June 5 at Doerr's Grove, Millburn, N. J. The day was marked by pleasant weather and almost all of those attending participated in one or more of the planned activities. Frank Raba and M. R. Buffington served as co-chairmen of the event. One of the highlights of the day was the baseball game which was won by the team captained by Larry Eby (Enjay). Exploding for seven-runs in the second inning, the Eby team went on to win the game by a score of 9 to 7.

Winners of the various events included the following: *Horseshoes*, Bill Lamela (Okonite); *Darts*, Roger Daley (Columbian Carbon); *Basketball Throw*, R. H. Burd (Parker-Stearns), and *Baseball Throw*, Matty Mankiewicz (Manhattan Rubber). B. McMartin and G. Walker, both of DuPont, won team honors in a boccie contest that was marked by keen competition. In the golf contest, W. H. Crom (Merck) took top honors with a well placed putt that stopped 8½-inches from the pin. Disciples of Izaak Walton conducted a fly casting contest, and a hit-the-bottles game awarded cigarettes to the pitchers who were able to knock the bottles off the table on three throws.

Spring Meeting Held

► Approximately 80 members attended the Spring Technical Meeting and smorgasbord dinner of the Southern Ohio Rubber Group held on April 3 in the Gibbons Hotel, Dayton, Ohio. The technical part of the meeting was held on the subject of "Advertising—Science, Game or Hoax," in which various aspects of industrial advertising in general were discussed. The talk was covered by J. H. Hershey, director of public relations for the Dayton Rubber Co.; Wes Highmiller, president of H & H Art Studios (Dayton), and Vince Koepnick, account executive for the Geyer Advertising Co. (Dayton). A general discussion following the technical session delved into the problems of advertising as related to the rubber industry and a definition between good and bad advertising was clarified. The problems of cooperation between engineering, laboratory, purchasing and sales departments, and ways of reducing sales costs through effective advertising, were other topics discussed at the meeting.

Michigan Chemical Names Coleman

► Michigan Chemical Corp. of St. Louis, Mich., has announced the appointment of David M. Coleman as a chemical sales representative. Mr. Coleman was previously employed by Olin Mathieson where he served in various sales capacities. Prior to that, he was associated with the Hooker Electrochemical Co. He is a World War II Navy veteran. Mr. Coleman is a graduate of Worcester Polytechnic Institute and took post-graduate work at Niagara Universtiy. He is a member of the American Chemical Society, the Armed Forces Chemical Association and numerous chemical sales groups.

DuPont Files Patent Suit Against Phillips Petroleum

► E. I. du Pont de Nemours & Co., Inc., has filed a suit in United States District Court, Wilmington, Del., charging the Phillips Petroleum Co. and its subsidiary, Phillips Chemical Co., with infringement on a DuPont patent on linear polyethylene. The company said the suit, filed on June 20, followed "extended negotiations" with Phillips over licensing arrangements. "When these negotiations failed to produce an agreement," the company stated, "DuPont had no recourse but to file the infringement suit, which seeks an injunction against continued manufacture and sale by Phillips of the plastic."

DuPont received a "composition of matter" patent on the plastic last December, although several other companies were producing the material, and contended that this patent covered the product no matter how it was manufactured. When the company first announced its patent award, Phillips had licensed several large concerns to use a linear polyethylene manufactured by its own process. A spokesman for Phillips said at that time that the DuPont patent was based on an old process that was "entirely different from the Phillips Process" and contended that Phillips' patent applications would not be affected.

DuPont said that it was still prepared to negotiate license agreements with others in the plastics industry who are interested in the product. Linear polyethylene, also called low pressure or high density polyethylene, is said to be stiffer, less waxy and more resistant to heat and chemicals than conventional high-pressure polyethylene.

Mansfield Plans Two Bond Issues

► Mansfield Tire and Rubber Co., Mansfield, Ohio, has registered $7,511,400 of debentures with the Securities and Exchange Commission, of which $2,511,400 will be convertible subordinated debentures while $5,000,000 will be sinking fund debentures. The convertible issues, approved by stockholders at a special meeting held on June 21, will be offered initially to them for subscription on the basis of $100 of debentures for each twenty-two shares held of record June 24. The sinking fund debentures will be sold through A. G. Becker & Co., Inc., who will also underwrite the convertible issue. Proceeds from the two debt sales will be used to retire $3,427,000 in long-term debt and all preferred stock now outstanding.

Bisonite Phenolflex No. 957

► Bisonite Co., Inc., Buffalo, N. Y., has developed a new protective coating material for use on latex storage tanks, designated "Bisonite Phenolflex No. 957". Due to the high solids content of the material, a heavy layer may be obtained with three or four coats, providing protection from corrosion and contamination. According to the company, the new product has been in successful use for oils and greases, solvents, acids and alkalis.

Weaver

Snyder

Stiff

Bosworth

Columbian Carbon Appoints Four

► Thomas E. Weaver has been named manager of the Boston, Mass., sales office of the Columbian Carbon Co., succeeding Donn Snyder who has been appointed assistant to the sales manager of the principal office of the firm in New York, N. Y. Mr. Weaver, whose headquarters are in the Park Square building in Boston, was formerly employed by Spencer Kellogg & Sons. He is a member of the Executive Committee of the New England Paint, Varnish and Lacquer Association and a graduate of the Wharton School of the University of Pennsylvania. At the same time John F. Stiff, formerly manager of the Detroit sales office, has been transferred to New York as Eastern District sales manager of the firm. Edward I. Bosworth has moved from the Akron office to become branch manager in Detroit, replacing Mr. Stiff.

Columbian Carbon also announced that enlarged facilities for research will be provided by the end of 1958 in the company's new million dollar research headquarters now being built on Plainsboro Road near Princeton, N. J. The announcement said facilities will cover present and expected needs in all phases of research and development on carbon black, pigments and related fields. The new research headquarters comprises two single-story buildings with a total floor space of 30,000 square feet. One of the buildings will contain the main entrance, reception area, administrative offices, library, file rooms and a group of six laboratories devoted to basic chemical and physical research.

The second building, which is connected to the first by a ten-foot corridor, will contain a group of seven large laboratories devoted to development and application research, the lunchroom, large conference room, machine and maintenance shops, shower and locker rooms. The largest laboratories in this group are assigned to the rubber division, with a mill-press-preparation room of approximately 2,500 square feet and a test room of 1,800 square feet. With its adjacent offices, file room and storage rooms, the rubber division will be a compact, integrated unit designed to carry on parallel research and technical service activities.

Goodyear Continues Science Aid

► Goodyear Tire & Rubber Co., Akron, Ohio, will offer summer scholarships and work-experience awards to mathematics and science teachers, in continuation of the educational program instituted in 1956 to encourage greater participation in science careers. To include instructors of grades seven through twelve in area schools, the program will permit those selected for awards to attend fully accredited colleges or universities anywhere east of the Mississippi River. The courses will run from six to twelve weeks in science, mathematics or engineering. Instructors will also be given a 10 week program in various departments of science, engineering and research divisions of Goodyear Tire. Scholarship participants will get cash awards at the same weekly rate of pay they receive for the 1957-58 school year. Tuition, laboratory fees and round-trip transportation will also be paid by the company. To be eligible for the awards, teachers must have at least 60 per cent of their current schedule in mathematics or science.

Issues Technical Data File

► Texas-U. S. Chemical Co., New York, N. Y., has announced publication of an up-to-date technical data file on butadiene-styrene rubbers for use by rubber compounders, purchasing agents and design engineers. According to the company, the file, in one handy working reference, contains the most complete information ever made available on "Synpols", the company's brand name for its butadiene-styrene rubber. Full technical descriptions and specifications, physical and chemical properties, typical production values and standard test recipes are included. The bulletins in the new Synpol Technical Data File also contain numerous cost-tested compounding formulas and physical test data for a wide range of end-use applications. The binder will be periodically supplemented as new rubbers are introduced and additional compounding information is developed. Copies may be obtained by contacting Texas-U. S. Chemicals sales representatives or by writing to the company at 260 Madison Ave., New York 16, N. Y., on company letterhead.

A typical Trelleborg conveyor belt may be seen above in operation at a gravel pit, transporting gravel directly from the pit to the crushing plant.

Conveyor Belts New Swedish Specialty

▶ Trelleborg Gummifabriks AB., Sweden's leading rubber manufacturer, now specializing in the production of conveyor belting, is producing belting in a variety of lengths and in widths up to six feet which are suitable to serve in all climates including that of the tropical parts of Malaya and Africa and Arctic Norway and Sweden. Resistance to severe cold as well as to mold caused by a humid tropical atmosphere are said to be outstanding properties of the Trelleborg conveyor belts. Standard belting can be used at temperatures up to 158°F., while a notable special type belt made by the firm is the "Super Heat", which is built on to a patented glass fiber fabric and resists 347°F.

Other belting for specialized purposes includes the "Trelleborg Rugged", produced with a non-slipping surface that permits the transport of goods at an incline of 35°, and belting having transverse ribs or raised edges for various applications. For very heavy stresses, the company manufactures belting with an annealed carbon steel core made by the Swedish Sandviken Steel Works. An odorless and tasteless white rubber belting is manufactured for the confectionery industry, while belts that are not affected by oil have found application in the fish preserving industry. Although rubber belting is one of the company's most important products, also produced are tires tubing, hose, V-ropes, rubber flooring and molded parts as well as such specialties as bowling balls.

Shown below is an oil-resistant, tasteless and odorless, white Trelleborg specialty conveyor belt which functions in this instance as a sorting table for almonds.

Fort Wayne Summer Outing

▶ The Fort Wayne Rubber and Plastics Group held its seventh annual golf and summer outing on June 6 at the Tippecanoe Country Club, Leesburg, Ind., with 268 members and guests in attendance. Members and guests participated in golf, horseshoes, volley ball and cards, and a nearby lake was available for swimming. Golf prizes and door prizes were contributed by 111 participating companies. In the golf tournament, Dan Lamb (Firestone) was the winner of the Goshen Rubber Trophy with first low gross score. A trophy and prize for first low net score was awarded to Al Robinson (Harwick Standard). Winners of the other golf prizes follow: *One Putter Eighth Green*—Morris Keyser (Rohm & Haas); *Second Low Gross*—Dan Rieger (Bakelite); *First Closest to Pin*—John Ahler (Huber); *Second Closest to Pin*—Wayne Place (Jasper); *First Long Drive*—Morris Keyser; *Second Long Drive*—T. Reuterdahl, a guest; *Least Number of Putts, First*—Bill Ford (Columbian Carbon); *Least Number of Putts*—Second, J. J. McCarthy (U. S. Rubber); *High Gross*—J. Fehring, a guest; *Low Net Score, Second Place*—Al Hatfield (Goodrich); *Third Place*—F. Thompson (Marbon); *Fourth Place*—J. Speers (World Bestos); *Fifth Place*—W. Ferguson (Barr); *Sixth Place*—Ed Theall (Dryden); *Seventh Place*—Pete Dobbs, a guest; *Eighth Place*—Jack Lippincott (Dryden); *Ninth Place*—Paul Wilson (Overhead Door); *Tenth Place*—Howard Ling (Anaconda); *Eleventh Place*—Roy Marston (Columbian Carbon; *Twelfth Place*—Jim Place, a guest; *Thirteenth Place*—C. Anderson, a guest, and *Fourteenth Place* — John Porter (H. Muehlstein).

Thiokol Club Hears Mark

▶ Approximately 300 members and guests of the Thiokol Technical Club attended the June 12 dinner meeting held at the Thiokol Chemical Corp. in Trenton, N. J. The principal speaker at the meeting was Dr. Herman F. Mark, director of the Polymer Research Institute and professor of chemistry at the Polytechnic Institute of Brooklyn. Dr. Mark, who is recognized internationally for his work and publications in the field of polymer chemistry, spoke on "Progress in Stereospecific Polymers." Dr. Mark was introduced by Dr. Edward Fettes, director of Research and Development for Thiokol.

Dr. Mark noted that technical interest in polymers and large molecules is continuously growing. He discussed various mechanisms which have been developed which enable polymer chemists to control or regulate polymerization in order to obtain molecules of a specific configuration or structure. Preceding Dr. Mark's talk, Dr. J. C. Patrick, who has been named to receive the American Chemical Society's Rubber Division "Goodyear Award", was introduced. Dr. Patrick was formerly director of research for Thiokol and now, although retired, acts as a consultant to the company.

Egyptian Rubber Factory Sets Pace for Mid-East

► Operating as the Arab world's only tire factory, the Transport & Engineering Co. of Alexandria, Egypt, has been in production since 1956 with a daily capacity of 800 tires and tubes plus sizable amounts of camelback and other repair materials. This project is the result of a joint venture of Egyptian capital and American technology as supplied by the Mansfield Tire & Rubber Co. of Mansfield, Ohio. Factory and tire building machinery comes mostly from Western Germany and the United States. The heavy duty internal mixer was supplied by Werner and Pfleiderer of Stuttgart, while the 3-roll calender, the mills and the extruders were supplied by Berstorff of Hanover, West Germany. All the larger motors are Siemens and the high and low tension equipment comes from Voigt and Haeffner

Twenty-one tire building machines came from the Akron Standard Mold Co., and six 55-inch and five 45-inch Bag-O-Matics were purchased from the McNeil Machine & Engineering Co., both firms of Akron, Ohio. A batch off tank, conveyors and cooling troughs were built in Egypt under the supervision of Mansfield's field engineer.

Increases Production Efficiency

An additional set of fabric drying drums for the calender was locally manufactured when it was found that extra drying capacity would increase production efficiency. The factory layout is on the up-to-date single plan type. Rubber is mixed on the mezzanine floor at the north end of the factory, dropped to the ground floor on an 84-inch Berstorff mill, and flows from there through the calender, extruders and bead making machinery to the south end of the factory where curing, inspection and finishing take place.

When production of conventional black sidewall tires started in March, 1956, a specialized labor force was nonexistent. Mansfield supplied a technical training course that turned out a core of competent tire builders and machine operators, who in turn instructed a labor force of 400 that is now entirely Egyptian.

Enters Exporting Field

Many enquiries from neighboring countries for the purchase of Egyptian "Nisr Supreme" tires has resulted in over $1 million worth of exports to Jordan, Lebanon and Turkey. Based on this favorable export picture and the steady growth of the home market, expansion is presently planned in stages that will raise capacity to a million tires a year by 1960.

Most of the ordering for the first stage of expansion has already been done, mainly with the same German and U. S. firms that supplied the original equipment. Currency restrictions, machinery breakdowns and delays in shipment have provided many obstacles in the operation of the plant. Emergency air-shipments of bladders, machine parts and chemicals were required several times. In spite of so many handicaps, production has been uninterrupted and steadily increasing. A quality improvement and product development program has been going on almost since the beginning of the venture, which should help this factory take the lead in local markets and fill a void in the economy of the Arab Middle East.

Columbia-Southern Opens Research Center

► Dedication ceremonies were held recently for the new Research Center of the Columbia-Southern Chemical Corp. at Barberton, Ohio. The new laboratory is a modern building specifically designed to achieve maximum efficiency and flexibility in space utilization. The building which formerly housed research at Barberton has been extensively modified and rearranged to complement the new facilities. Analytical and physical testing and product application research are concentrated in the old building. Company officials said the new Research Center represents recognition by the company of the immediate and long range importance of research and development. Facilities in the new Research Center include laboratories for the testing of textiles, paper pulp, chlorine hydrocarbon applications, mineral research, and rubber compounding. In the rubber compounding laboratory, the functions of pigment control, new pigment evaluation, customer compounding service and compounding research are carried on.

One of the most recent results of the work accomplished in this laboratory was the development of "Hi-Sil" and "Silene" reinforcing pigments which have made color and quality compatible in the rubber industry. Dr. John C. Warner, president of Carnegie Institute of Technology, spoke at the dedication ceermonies of the new Research Center.

Firestone All-Traction Tire

► Firestone Tire & Rubber Co., Akron, Ohio, has introduced an improved version of the "Champion Ground Grip Tire" called the "All-Traction Tractor Tire", which incorporates a new compound said to have increased the tire's tread life and body strength. Designated "Rubber-X", the new compound is said to have increased tread life substantially in either field or highway operations. The All-Traction has an increased number of cords per square inch coupled with stronger rayon, a combination which results in 10 to 30 per cent more strength than that of other rayon tires with a similar rating, Firestone states. Maximum traction was assured with retention of the Firestone open-center type tread design.

Named Huntley Sales Agent

► The Mining and Mineral Products Division of Great Lakes Carbon Corp., Los Angeles, Calif., has become the sales agent in the United States and Canada for clay, talc, pyrophyllite and other products of Huntley Industrial Minerals, Inc., Bishop, Calif. Huntley owns and operates several deposits of high-grade, non-metallic minerals, principally kaolin clay, talc and pyrophyllite, and mining and development work on other non-metallic minerals is also underway. Its products are now being used in the rubber, ceramics, insecticide, paper, paint and glass industries and tests indicate substantial potentials in other large areas such as agriculture. It is believed that the addition of the Huntley products to those of Great Lakes Carbon is a natural rounding out of the firm's own line of non-metallic minerals and an advantage to Great Lakes' customers. Research and development work to be undertaken by the Great Lakes Carbon laboratories will free Huntley laboratory facilities for increased quality-control activities, and sales work to be handled by Great Lakes will allow further attention to nonmetallic mine resources.

Names in the News

Arthur H. Phillips, an attorney for Godfrey L. Cabot, Inc. since 1955, has been appointed general counsel and secretary for the firm, succeeding **Fred C. Fernald,** who has retired as vice-president, general counsel and secretary.

Jack Sherman, one of the founders of the Plicose Manufacturing Corp., has retired as president of the organization.

Charles F. Andrew, director of planning and economics for the United Carbon Co., was one of the 50 prize-winners in a competition aimed at defining the country's most important future economic problems.

William E. Conklyn, who has been in sales work since 1935, has been named vice-president of sales for the Fife Manufacturing Co., Inc.

Kenton Cravens, chairman of the board for the Eagle Rubber Co. and president of Mercantile Trust Bank of St. Louis, was the main speaker at a Business-Education Day program held by elementary, high school and college teachers of Ashland, Ohio.

Quandt M. Adams, who previously worked on the development of the acrylic acid process, has been promoted to senior technical man at the new glacial acrylic acid plant in Calvert City, Ky., for the B. F. Goodrich Chemical Co.

Leonard L. Krause, formerly supervisor in the controller's office at the Cleveland Foundry of the Ford Motor Co., has been appointed controller for the Valvair Corp. and the Sinclair-Collins Valve Co.

Stanley Bennett, general sales manager for the Beebe Rubber Co., has been elected a director of the firm.

Bernhardt Denmark has been appointed a vice-president of the International Latex Corp., in which post he will be in charge of Family Products Division Marketing.

Daniel B. Witwer, previously manager of the Acetylene Chemicals Department of the General Aniline & Film Corp., has been elected vice-president for Polyvinyl Chemicals, Inc.

William C. Lytle, formerly assistant to the senior vice-president, has been elected a vice-president of the Atlas Powder Co.

William K. Hipp, formerly associated with Dan River Mills, Inc., has joined the Houston, Texas, sales residency of the Pennsylvania Industrial Chemical Corp.

William Feick, Jr., treasurer of the Flintkote Co., has been elected a vice-president of the firm.

Dr. Max Levine has been appointed group leader in organic research at Industrial Rayon Corp., Cleveland, Ohio.

Raymond C. Firestone, president of the Firestone Tire & Rubber Co., Akron, Ohio, has been elected vice-president of the National Committee on Boys and Girls Club Work, a non-profit organization cooperating in furthering 4-H Club Work.

Dr. R. P. Dinsmore, vice-president in charge of research and development for the Goodyear Tire & Rubber Co., and **A. L. Freedlander,** chairman of the board of the Dayton Rubber Co., received special citations from the Indiana Technical College for their outstanding contributions to industrial development through management, science and engineering.

Harold B. Lawson, formerly treasurer of the Dobeckmun Co. of Cleveland, Ohio, has been elected assistant secretary and assistant treasurer of United Carbon Co., Charleston, West Va.

Thomas M. McLoughlin, who joined the company in 1949, has been appointed industrial sales manager of the New York district for the Stauffer Chemical Co.

Herman R. Thies, general manager of the Chemical Division of the Goodyear Tire & Rubber Co., recently received an honorary Doctor of Science degree from Phillips University of Enid, Oklahoma.

H. P. Schrank, executive vice-president of Seiberling Rubber Co., has been elected to honorary membership in Beta Delta Psi, honorary fraternity in the college of Business Administration at the University of Akron.

James G. Park, vice-president of the Enjay Co., Inc., retired on July 1 after 38 years of service with the firm.

John B. Townsend, formerly with the Boston Woven Hose & Rubber Co., has been appointed sales representative of the Acme and Hamilton Rubber Manufacturing Divisions of the Acme-Hamilton Manufacturing Corp. of Trenton, N. J.

J. H. (Jack) Crary, vice-president in charge of sales for the Gates Rubber Co., has retired after 44 years of service with the company.

William P. Kelley, formerly vice-president in charge of sales of the Kitco Engineering & Manufacturing Co., has been appointed to the new position of manager of molded and extruded sales for the Ohio Rubber Co., Willoughby, Ohio.

E. E. Laughlin has been named manager of compounding at the Natchez, Miss., plant for the Armstrong Rubber Co.

Receives First Scholarship

► The first annual Harmon Connell Memorial Scholarship was presented to Leslie Drane, Jr. (right) at the recent Southern Rubber Group meeting in Memphis, Tenn., by Lenoir Black (C. P. Hall), a member of the Education Committee. Mr. Drane, who majors in chemical engineering, is a senior at Mississippi State College. The $500 scholarship was organized and financed by the members of the Southern Rubber Group in memory of their first chairman, the man most active in the formation of the group, the late Harmon (Red) Connell, of the Armstrong Tire and Rubber Co., Natchez, Miss. The scholarship will be given every year to a deserving chemical engineering student at Mississippi State.

Goodyear Acala Process Hose

► A new hose manufacturing process has been put into volume production at the North Chicago, Ill., plant of the Goodyear Tire and Rubber Co., which is said to produce on an economical basis, a long length hose having dimensional stability. Called the "Acala Process", the new method is considered to be a significant "break-through" in hose design. Conventional braided hose shortens in length under pressure as much as 18 per cent, thereby requiring that longer than necessary lengths be installed in service. Goodyear claims that the new type hose eliminates the danger of "coupling pull-off". Acala process hose is produced completely sealed in liquid and undergoes temperature changes from many degrees below zero to several hundred degrees above during the production process. While its temperature range is great during production, the braid angle of Acala hose is constant, thus restricting movement of hose during production and service.

Metro Buys Blackhawk

► Metro Rubber Products Corp., Morris, Ill., has purchased the assets of the Blackhawk Rubber Products Co., Rockford, Ill. The manufacturing facilities have been moved to Morris, where they will be operated as the Blackhawk Rubber Co., a division of Metro Rubber Products Corp. Bert C. Oveson, president, and Rober M. Erickson, secretary of Blackhawk, will continue in these posts.

Connecticut Hears Talk On Purchasing Procedures

► The Annual Spring Meeting of the Connecticut Rubber Group held on May 23 at Manero's Restaurant in Orange, Conn., featured a talk on "Purchasing Procedures as Related to Production Problems." Edward S. Muller, purchasing supervisor of the Naugatuck Chemical Division of the U.S. Rubber Co. and purchasing supervisor of the Purchasing Agents Association of Connecticut, Inc., and W. A. Ware, purchasing agent of the Naugatuck Footwear Plant, U.S. Rubber Co., stated that the basic philosophy behind purchasing procedures is that the purchasing agent can help the company do its job more effectively. With his special qualifications, the buyer has a real place in the industrial economy and a special place in company affairs.

After chemists and engineers develop adequate specifications, it is up to the competent purchasing agent to insist that vendors conform to these specifications. The buyer can also help by assisting in standardization and value analysis in his company. He further helps by obtaining the vendors' technical help and acts as the liaison between his company and the vendor on quality and other disputes. In addition to this, the buyer can save valuable company time by screening and interviewing salesmen, and can keep the company informed on current outside developments. The buyer acts as an aide to production men by informing them of arrival dates and delays, changes made in original requisitions, and by establishing adequate raw material specifications. By developing alternate sources of supply, the purchasing agent can expedite orders and assure continuity of the production run, asserted Messrs. Muller and Ware.

The buyer helps his own salesmen and company by supplying information on purchases made, and by keeping them posted on market conditions and availability forecasts which would affect sales. Acting as the company front man, the purchasing agent helps salesmen who call on him to get an audience with the proper people. The purchasing agent helps his own company management by negotiating for the best price and terms for maximum profit. As contact man for the company, the purchasing agent is an important link in management make-or-buy decisions, the authors concluded.

Plans New Foam Rubber Unit

► Dayton Rubber Co., Dayton, Ohio, has announced plans to build or lease facilities for a foam rubber fabrication plant in High Point, N. C. Sales offices and complete fabricating and warehousing facilities will be opened in High Point as soon as possible, a company spokesman said. The new facilities are expected to enable Dayton to extend customer service throughout the rapidly growing southern furniture manufacturing market. The company is one of the major suppliers of both latex foam and urethane foam to the furniture industry.

William H. Jefferson

William J. Watson

General Latex Appointments Announced

► General Latex and Chemical Corp., Cambridge, Mass., has announced the promotion of William H. Jefferson from general manager of the Ashland, Ohio, plant to assistant to the president at the Cambridge, Mass., plant. He will be succeeded as general manager at Ashland by William J. Watson, previously sales representative in the Midwestern area. The company has also announced the appointment of C. R. Hunnell and Donald O'Connell as sales representatives. Mr. Jefferson has served the company as district sales manager and general manager for two years at Ashland. Previously, Mr. Jefferson was with the J. H. Mulholland Co., Milford, Del., and Bayshore Industries, Inc., Elkton, Md.

Mr. Watson, who joined the company two years ago, had previously served in sales managerial positions with Webb's Lincoln-Mercury and Brooks-Ford, Milford, Del. Mr. Hunnell was formerly associated with the Flooring Division of the Goodyear Tire & Rubber Co., Akron, Ohio. He will represent the company in the Minnesota, Wisconsin, Illinois and Indiana territory. Mr. Hunnell is a graduate of Kent State University. Mr. O'Connell, a graduate of the University of Cincinnati with a degree in chemical engineering, was formerly associated with the B. F. Goodrich Co., Akron, Ohio, as a research engineer. He will serve as sales representative in southern Ohio, southern Indiana and Missouri.

U. S. Rubber Licenses Paris Firm

► U. S. Rubber Co., New York, N. Y., has granted an exclusive license to Societe d'Electro-Chimie d'Electro-Metallurgie et des Acieries Electriques (Ugine), to manufacture Paracril oil resistant synthetic rubbers and Kralastic high impact plastic materials in France. Under the terms of the agreement, the company licenses the Paris chemical manufacturer under patents it holds in France. U. S. Rubber will also provide technical assistance for the construction and operation of a plant to produce acrylonitrile butadiene-styrene copolymers and nitrile, oil-resistant synthetic rubbers. Ugine has been a producer of specialty steel alloys and electro chemicals for many years and since World War II, has expanded into organic chemicals. The addition of the new materials to its commodity line, will make Ugine one of France's principal suppliers of specialty synthetic rubbers and high impact plastics. Until the present, special synthetic rubbers, latices and acrylonitrile butadiene-styrene plastic resins have been imported into France from the U. S. and Canada.

Plan New Laboratories

► According to the 1957 annual report recently issued by the Columbian Carbon Co., new laboratories will be built by the company at Princeton, N. J., in 1958 for operation early in 1959. They will provide facilities for uninterrupted continuity of basic research in, and development of, new applications for the company's present product lines and processes. Construction and use of these new planned facilities will permit the laboratories now located at Brooklyn, N. Y., Monroe, La., Trenton, N. J., and Tacony, Penna. to apply themselves more completely to product and process improvement. Further, the new laboratories at Princeton will provide needed room and facilities for research directed wholly toward new products and processes for manufacture. The report also indicated that Columbian Carbon spent a total of $1,442,000 in research and development last year. Sales of all types of carbon black in 1957 reached 321,753,000 pounds, a slight increase over the 319,600,000 pounds sold in the previous year.

Kemp Named Research Associate At Tlargi Foundation

► A. R. Kemp, well-known consulting chemist who has specialized in all phases of rubber research, compounding and manufacture, has been appointed a research associate at the University of Southern California, where he will be engaged in fundamental research in the field of rubber and polymers under the auspices of the Tlargi Rubber Technology Foundation. A native of South Dakota, Mr. Kemp attended the California Institute of Technology, where he obtained a B.S. degree in chemistry in 1917 and an M.S. in 1918. With three theses published, he is approaching completion of work towards a Ph.D. degree.

Mr. Kemp began his career in 1917 as a research and control chemist in the General Petroleum Co. in Vernon, Los Angeles. In 1918, he joined the Chemical Research Department of the Western Electric Engineering Division in New York City, which became the Bell Telephone Laboratories in 1925. At this organization, he was in charge of research and development in rubber, plastics, wire and cable insulations, adhesives, coating and organic chemistry and also directed factory operations at Western Electric Co. and in European cable factories.

A. R. Kemp

Supervised Many Innovations

During his career with the Bell Telephone Laboratories, Mr. Kemp supervised many important innovations. He was associated with the development of Catalina submarine cables, and worked on pressure equalizers for high speed permalloy loaded-Gutta Percha insulated telegraph cables. Development of continuous vulcanization of rubber covered wire took place under his supervision and he conducted many Gutta Percha and Balata studies. He also invented and supervised development and application of Paragutta for insulation of submarine telephone cables, usually 100 to 200 miles in length, and introduced Paragutta into German, English and Japanese cable factories.

Work on Neoprene Jackets

Mr. Kemp also helped with the development of neoprene jackets to replace cotton braids on rubber covered telephone distribution wires with complete conversion after World War II. He was charged with the responsibility for introduction of synthetic rubber in Western Electric manufacture to replace natural rubber, and was the first to obtain polyethylene samples from ICI through the British Post Office in 1938. He developed and applied polyethylene to its first commercial use in 1940 for coaxial cable insulation for which it later became the standard insulation.

During World War II, Mr. Kemp served on the Radar Insulation Committee to write polyethylene specification for radar cable. Also during the war, he served on various committees, supervised the development of numerous military projects at Bell Telephone and assisted on the Manhattan Project. After the War, he supervised fundamental and developmental research on the properties of polyethylene and improvement of its out-door weathering with carbon black and antioxidants, making possible its extensive replacement of lead sheaths to solve a critical problem of lead shortage. Early studies of polyethylene under Mr. Kemp's supervision led to the development of polyethylene for insulation or repeatered transoceanic telephone cable.

Retired in 1948

He retired in 1948 to carry on private consulting practice. From October, 1950, to January, 1951, he became a special consultant for Major General Ward H. Maris, General Staff, U. S. Army Department of Defense in Washington, D.C., to survey the status of rubber research and development in the Department of Defense. He gave up consulting in 1951 to join Narmco, Inc. as vice-president and director. As works manager for Narmco Resins and Coatings Co., he directed research on the improved high temperature metal and adhesive "Metlbond". He resigned as president and director of the organization in 1952 to resume his consulting practice. The recipient of three honorary awards, Mr. Kemp has published 49 articles in various journals, has 38 U. S. Patents issued and approximately 300 foreign patents, applications covering rubber and plastics technology. He is a member of several technical organizations.

Vickers Opens New Plant

► Vickers Petroleum Co., Wichita, Kansas, has announced the start-up of its new $3.5 million Udex extraction plant at Potwin, Kansas, the first petrochemical plant to be built by an oil company in the state. The new plant initially will produce benzene and toluene of reagent quality along with xylene and Solvent V-100, a high flash point petroleum aromatic solvent used in baking enamel finishes. Company officials said that following the initial test runs, all of the petroleum aromatics manufactured at the new plant met or exceeded ASTM specifications. The new BTX (benzene, toluene, xylene) plant in addition to manufacturing Solvents V-100 and V-125, plans to produce Solvent V-150 at a later date. The numerical designation of these special high quality aromatics refers to their flash point. Production at the Vickers BTX plant is expected to reach over 15 million gallons of petroleum aromatics annually. Vickers' spokesmen said that undoubtably, benzene will rank as the most important of the new chemicals, with the rubber, paint and plastics industries to be the largest consumers. They said that with the opening of the new plant, the way is being paved for entry into the petrochemical field with many other products, thus providing further diversification for the company.

Poncet Davis Paroled

► Poncet Davis, Akron industrialist who was convicted of income tax fraud in 1954, has been paroled from the Medical Center for Federal Prisoners at Springfield, Mo. According to current reports, Mr. Davis plans to "get back in harness" as soon as possible as head of the Poncet Davis Co., a selling agent for textile mills. How soon he can begin operations will depend on the orders of his physician. The 59-year-old industrialist is suffering from a heart condition and arthritis. Convicted of evading $738,249 in personal and corporate income taxes between 1945 and 1948, Mr. Davis has served 17 months of a four year sentence. Federal law allows parole consideration after one-third of a sentence has been served. With the prison term, he was also fined $40,000, which has been paid.

Tracerlab Names Anthony

► Tracerlab, Inc., Waltham, Mass. has announced that Charles H. Anthony has become associated with the firm as a sales engineer. Prior to joining Tracerlab, Mr. Anthony served with E. I. du Pont de Nemours & Co., Inc., for three years in various engineering capacities among which was project coordinator during the construction of the Savannah River Plant of the Atomic Energy Commission. Mr. Anthony received his Bachelor's degree in civil engineering from Yale University in 1951. He served with the United States Coast Guard both aboard the USCGC Casco and as commanding officer of the Coast Guard Loran Transmitting Station, Ulithi, Western Caroline Islands in the Pacific.

A. L. Back

Enters Consulting Service

► A. L. Back & Associates, West Chester, Penna., a new firm specializing in latex, rubber, engineering and statistical quality control problems, has recently been opened by A. L. Back. Mr. Back is a registered professional engineer with over eighteen years of varied experience in rubber, latex and polymers. He was previously chief chemist with a latex foam manufacturer. Mr. Back is currently teaching rubber technology courses at Villanova and Temple Universities, and for over ten years has been a contributor to *Chemical Abstracts* in the rubber, resins and organic chemicals sections.

Goodyear Appoints Six

► A move to streamline the development organization in giving improved customer service has resulted in the establishment of six new positions in the Industrial Products Division of the Goodyear Tire & Rubber Co., Akron, Ohio. A. R. Hacker, A. B. Hirtreiter, F. O. Leonard, R. H. Miller and E. C. Montgomery have been named chief engineers for prescribed areas of development work for the division. C. E. Taylor has been appointed chief chemist for the division's hose plant at North Chicago, Ill. The function of the new organization will be to plan, coordinate and control all phases of compounding, design and technical service for the division. They will coordinate development and planning efforts in harmony with the planning and needs of the division's sales departments. Mr. Hacker has been assigned to conveyor belt development. Mr. Hirtreiter will head up development work on automotive suspensions. Mr. Leonard will coordinate development activities for special industrial products. Mr. Miller will concentrate on rubber flooring and automotive mats. Mr. Montgomery will conduct development operations for tank lining and industrial rolls. Mr. Taylor, who will be located at Akron for the time being, will move to North Chicago when research and development facilities for hose are completed there.

U. S. Rubber Appointments

► U. S. Rubber Co., New York, N. Y., has appointed three assistant directors of research and development to streamline its research activities and speed new developments from the laboratory to the production plant. Dr. Arthur E. Brooks will direct all research on materials, T. J. Rhodes will head all engineering research, and Dr. D. Lorin Schoene will direct liaison between the Research and Development Department and the Manufacturing Divisions.

Dr. Brooks, who obtained his doctorate in physical chemistry from the University of Chicago, became a research chemist in the company's general laboratories in 1929. He was named manager of the new Research Center in Wayne, N. J., when it was opened last year. Dr. Brooks is the holder of four patents including one for micro-porous rubber and another for a new type of adhesive. Mr. Rhodes, an engineering graduate of Iowa State College, joined U. S. Rubber in 1942 as a process engineer for a munitions plant the company was operating in Des Moines, Iowa. Since 1953, he has been manager of the Mechanical Engineering Research Department. He holds 18 patents on a variety of processes for rubber and plastics manufacturing. Dr. Schoene, formerly director of research and development for the company's Naugatuck Chemical Division, obtained a doctorate in chemistry from Iowa State College. He joined the company in 1939 as a research chemist in the general laboratories. Dr. Schoene holds approximately 20 patents on agricultural chemicals, plastics, synthetic rubber and rubber chemicals.

Hooker Decentralizes Durez

► Durez Plastics Division of the Hooker Chemical Co., Niagara Falls, N. Y., has been decentralized and will now operate as an autonomous division of the company with production, sales and profits now a division responsibility. The three facilities involved are the division's headquarters plant at North Tonawanda, N. Y., which manufactures synthetic resins and molding compounds; the Kenton, Ohio, plant which manufactures phenolic molding compounds, and the Spokane, Wash., plant, which produces wood flour. A company spokesman said that since 1955, Hooker has nearly tripled in size and decentralization is expected to achieve maximum efficiency in its operations.

Dr. Jay C. Searer, formerly division works manager, has been named division general manager reporting to the president. Responsible to Dr. Searer, Alfred W. Hanmer, Jr., continues as division general sales manager. Charles Y. Cain, formerly administrative assistant to the division general sales manager, has been appointed division assistant general sales manager, John F. Snyder, Jr., who was works manager at Kenton, becomes production manager for the division and will transfer his office to North Tonawanda. William J. Parmley, formerly division supervisor of laboratory production and process development, moves to Kenton as superintendent. Lother A. Sontag will continue as division technical manager.

Wayne Benson

Appointed Sales Manager

► Wayne Benson has been named sales manager of the Tire Mold Division for the Bridgwater Machine Co., Athens, Ohio, succeeding W. M. Mapes, who died recently. Mr. Benson was formerly general manager of the company's Canadian plant in Brantford, Ont., and previous to that, he was in charge of production control at the Athens, Ohio, plant. He will be assisted by Elton Coleman, who has been associated with the Bridgwater Tire Mold Division for many years.

Adds Three Silicone Compounds

► Three new silicone rubber compounds designed for fabrication of O-rings, gaskets and other seals have been added to the standard product line of the Silicone Products Department of General Electric Co., Waterford, N. Y. Designated "SE-362," "SE-372," and "SE-382", these compounds meet or surpass the requirements of AMS 3303C, 3304B, and 3305C respectively. ASTM requirements also met by these compounds are those of TA604, TA704, and TA805. Featuring tensile strengths of 1,000 to 1,200 psi and compression sets ranging from 17 to 19 per cent after standard cures, these new compounds offer far better physical properties than earlier Class 300 compounds, according to General Electric. Improved tear strengths are another feature, ranging from 65 to 75 pounds per inch after an over cure of four hours at 480°F. Linear shrinkage during cure is less than 2 per cent permitting use of these new compounds in most molds designed for production of organic rubber parts. Because of their low compression set and good oil resistance, the new compounds are said to be especially suited for seals used in contact with petroleum oils and most hydraulic fluids.

► Ball & Jewell, Inc., of Brooklyn, N. Y., has recently published "Bulletin S258" which fully describes the heavy duty "Steelmaster Granulator," used for all operations of tough to grind plastics such as high impact polystyrene, nylon, teflon, polyethylene, and vinyl.

Financial News

Seiberling Rubber

► Three months ended March 31: Net loss of $200,644, which is equal to a loss of 58c per share of common stock, compared with a net income of $182,542, or 31c a share, in the first three months of 1957. Sales in the quarter to March 31 totaled $9,343,477, compared with $10,501,219 in the same period of the previous year. Seiberling reported that the loss was from operations of the Canadian subsidiary. The company believes it will have good sales in the second and third quarters and will "operate profitably for the balance of 1958."

Thermoid

► Quarter ended March 31: Net income of $108,427, which is equal to 11c per common share, compared with $309,805, or 34c a common share, in the first three months last year. Common share earnings for 1958 were calculated after preferred dividend requirements. Figures for 1957 include four cents a share from operations and seven cents a share which were non-recurring and resulted from the sale of machinery in the course of liquidation of the Textile Division, which is expected to be concluded in the future.

Brunswick-Balke-Collender

► Quarter to March 31: Net income of $803,598, which is equal to 50c a common share, compared with $136,176, or 10c a share, in the equivalent quarter of 1957. Sales in the 1958 first quarter totaled $27,804,449, compared with $19,159,530 in the same period the year before.

Goodall Rubber

► Quarter to March 31: Net income of $63,912, which is equal to 13c a share, compared with $143,054, or 30c a share, in the same period last year. Sales in the first quarter of 1958 totaled $2,529,410, compared with $2,982,530, in the corresponding period of 1957.

Goodyear

► Quarter ended March 31: Net income of $10,857,506, which is equal to $1.02 a share, compared with $17,265,055, or $1.63 a share, a year ago. Sales in the first quarter of 1958 totaled $308,279,000, compared with $353,178,571, in the corresponding quarter in 1957.

Anaconda Wire

► Quarter to March 31: Net income of $501,817, which is equal to 59c per share, compared with $1,755,684, or $2.08 a share, in the corresponding period last year.

Triangle Conduit

► Quarter ended March 31: Net income of $569,827, which is equal to 42c per share, compared with $822,704, or 61c a share, in the first quarter of 1957. Sales in the three months to March 31 totaled $12,091,108, compared with $13,660,580, in the corresponding period of the preceding year.

New Jersey Zinc

► Three months ended March 31: Consolidated net income of $49,837, which is equal to 2½c per share, compared with $1,177,218, or 60c a share, in the similar period of 1957. Net sales in the first quarter of 1958 totaled $3,349,864, compared with $5,740,864 in the same period last year.

Electric Auto-Lite

► Quarter ended March 31: Net income of $644,787, which is equal to 41c a share, compared with $3,706,272, or $2.31 a share, in the 1957 first quarter. Sales in the first three months of 1958 totaled $44,239,107 compared with $80,273,510 in the same period of the preceding year.

St. Joseph Lead

► Quarter to March 31: Net income of $2,424,296, which is equal to 89c per share, compared with $2,757,042, or $1.01 a share, in the 1957 three month period. Sales in the first quarter of 1958 totaled $18,226,561 compared with $31,572,820, in the corresponding period last year.

Aetna Standard Engineering

► Nine months to March 31: Net income of $928,302, which is equal to $1.83 per share, compared with $967,544, or $1.91 a share, in the same fiscal period of 1957. Sales in the nine months to March 31 totaled $25,378,067, compared with $31,837,144, in the corresponding period last year.

General Cable

► Quarter to March 31: Net income of $1,635,762, which is equal to 55c per common share, compared with $3,013,047, or $1.06 a share, in the first three months of 1957. Sales in the 1958 first quarter totaled $2,815,784, compared with $2,759,528 at the same time last year.

Monsanto Chemical

► Quarter to March 31: Net income of $7,607,000, which is equal to 34c a share, compared with $14,886,000, or 67c a share in the 1957 first quarter. Sales in the first quarter of 1958 totaled $161,093,000, compared with $185,193,000, in the same period last year.

Firestone

► Six months ended April 30: Estimated net income of $21,264,682, which is equal to $2.52 per share, compared with $28,430,380, or $3.44 a share, in the corresponding period of the preceding year. Net sales totaled $490,854,806, in the fiscal half of 1958, compared with $550,422,328, in the six months to April 30, 1957.

Sheller Manufacturing

► Quarter to March 31: Net income of $5,895, which is equal to approximately 1c per share of common stock, compared with $591,294, or 62c a share, in the first quarter of 1957. Sales in the three months to March 31 totaled $6,751,359, compared with $11,875,676, in the corresponding period of the preceding year.

Lee Rubber

► Six months to April 30: Net income of $650,483, which is equal to 77c per share, compared with $713,587, or 84c a share, in the corresponding six months of the preceding year. Sales in the first half of the fiscal year totaled $20,599,521, compared with $21,794,591, in the 1957 fiscal half.

Minnesota Mining

► Quarter to March 31: Net income of $7,969,374, which is equal to 47c per share of common stock, compared with $9,762,181, or 58c a share, in the first quarter of 1957. Sales in the first three months of the year totaled $85,207,362, compared with $89,475,428, during the same period last year.

Rubbermaid

► Six months to March 31: Net income of $438,272, which is equal to 37c a share, compared with $461,170, or 40c a share in the 1957 first half. Sales in the first six months of this year totaled $10,159,463, compared with $9,868,699, in the same period last year.

Dayton Rubber

► Six months ended April 30: Net income of $503,158, which is equal to 44c per share, compared to $917,205, or 95c a share during the same period last year. Sales in the first half of fiscal 1958 totaled $38,210,005 compared with $37,356,158, in the same period last year.

Hewitt-Robins

► Quarter to March 31: Net income of $225,648, which is equal to 54c per share of common stock, compared with $330,574, or 81c a share, in the same period last year. Sales in the first quarter of 1958 totaled $12,707,902, compared with $15,318,340, in the 1957 first quarter.

Belden Manufacturing

► Quarter to March 31: Net income of $105,711, which is equal to 27c a share, compared with $422,745, or $1.08, a share, in the same period of 1957.

Ray McCurdy

Joins Marbon Chemical

► Ray McCurdy, formerly associated with the Goodyear Tire and Rubber Co., Akron, Ohio, has been named technical sales representative for the Marbon Chemical Division of the Borg-Warner Corp., Gary, Ind. His territory will include southern Ohio, Kentucky, Tennessee, Georgia, Alabama and Florida. For the last two years, Mr. McCurdy was a special representative for Goodyear's Chemical Division, selling plastics, resins, synthetic rubber, latex and adhesives. He also spent several years as a production supervisor in the Tank Lining, Printer Roll, Belt and Asbestos Departments. Before joining Goodyear, Mr. McCurdy worked for two years at the Fremont Rubber Co. as a production superintendent. He attended Kent State University.

Dunlop Politon K.745

► Dunlop Rubber Co., Ltd., has developed a new synthetic latex, "Politon K.745", at its research center in Birmingham, England. Said to be especially suited to applications where oil-resistance and heat-aging are important, the product has been successfully tested in dipping oil-resistant protective gloves and insulating sleeves. Latex compounders have also used it as a raw material for their compounds, and adhesives manufacturers, for laminating compounds. According to Dunlop, the abrasion resistance of rayon, gabardine and cotton can be much improved by applying Politon, which can also be used as the binding agent in the non-woven fabrics where oil-resistance is needed.

Elected Alco Vice-President

► Alco Oil and Chemical Corp. has elected Myron S. Gelbach, Jr., as a vice-president of the firm. Associated with Alco for two years, Mr. Gelbach is a graduate of the Harvard Business School. He is a Navy veteran of World War II and the Korean conflict.

Offers Rubber Technology Course

► The Ontario Rubber Group in conjunction with the Rubber Division of the Chemical Institute of Canada, has announced that a course in Rubber Technology will be presented through the Extension Department of the University of Toronto beginning October 8, 1958. The course will be broken up into two semesters, consisting of 10 lectures before Christmas and 10 in the new year. All lectures will be held on Wednesday evenings at the University of Toronto and each lecture will be of two hours duration. The same course will be presented in Montreal through McGill University on the Thursday following the lecture in Toronto. The expected fee for this course will be in the neighborhood of 25 to 30 dollars per person, which will include the publication of the lectures at the end of the course. The lectures and dates are as follows:

October 8: Introductory talk, by N. S. Grace and "History of the Rubber Industry," by J. W. Symons.
October 15: "Natural Rubber."
October 22: "Polymerization," by Dr. I. H. Spinner.
October 29: "Synthetics (Styrene Rubber Types)," by E. E. Gale.
November 5: "Synthetics (Butyl, Nitrile)," by H. Pfisterer.
November 12: "Neoprene, Hypalon, Polyurethane Elastomer," by DuPont.
November 19: "Reclaim, Thiokol, Silicone," by A. Beauchamp and D. Miller.
November 26: "Antioxidants, Antiozonants, Waxes, etc.," by C. R. Howey.
December 3: "Carbon Black," by J. W. Snyder.
December 10: "Non-Black (Re-inforcement)," by R. Wolf.
January 14: "Vulcanization (Accelerators)," by G. C. Maassen.
January 21: "Latices and Foam Rubber," by T. H. Rogers.
January 28: "Testing Methods and Equipment," by H. Deline.
February 4: "Art and Science of Compounding," by B. S. Garvey.
February 11: "Textiles and Fibers (Rayon, Nylon, Cotton)," by J. Benns.
February 18: "Production Machinery (Mixing Machines—Calenders)," by E. Dyer.
February 25: "Production Machinery (Curing Equipment, Extrusion Equipment)," by V. Hovey.
March 4: "Products (Tires, Footwear)," by M. Morgan and W. H. Bechtel.
March 11: "Products (Industrial Rubber Products, Wire and Cable)," by E. D. Jackson and Emil H. Schwartz.
March 18: "Future Materials and Processes," by E. M. Immergut.

Named Plant Manager

► Rubatex Division of Great American Industries, Inc., Bedford, Va., has named Donald E. Cornmesser plant manager. Mr. Cornmesser was previously works manager for the Bridgeport Rubber Co., a division of H. O. Canfield Co. in Bridgeport, Conn.

Victor E. Buehrle, Jr.

Joins Columbian Carbon

► Victor E. Buehrle, Jr., has joined the Akron, Ohio, sales staff of the Columbian Carbon Co., New York, N. Y. Mr. Buehrle, was formerly associated with the B. F. Goodrich Co. and General Tire & Rubber Co., and is a graduate in chemistry from Kent State University. He is a member of the American Chemical Society, several rubber groups, the Technical Association of the Pulp & Paper Industry and the University Club of Akron.

To Produce Plastic Shoes

► Utrilon Corp., a Delaware firm, has been organized to manufacture injection-molded plastic shoes. Leonard Rae, president of the company, said the firm had improved on a basic polyvinylchloride formula first used in France several years ago. With an initial capitalization of $600,000 Utrilon will set up a plant to make plastic footwear by molding under 80,000 pounds pressure per square inch. Mr. Rae said he had obtained exclusive rights to the molding machines in Australia, where Utrilon footwear has been sold since last year. According to Mr. Rae, his Australian company, Universal Injection Moulders, Pty. Ltd., was able to improve on the process as a result of its wartime experience in substituting plastic for aluminum in bullet cores.

Appleton Opens Chicago Office

► A new Chicago, Ill. sales office and show room of the Appleton Machine Co. has recently been opened under the managership of William Boas, who was previously a consultant to the packaging industry. Mr. Boas, while head of M. G. Boas & Son, developed a technique of printing on acetate, cellulose, polyethylene and other clear plastics. Prior to this he was associated with Flexible Package Co. Appleton's newly acquired Doven line of specialty slitters and rewinders will be displayed in the new Chicago show rooms.

From left to right: R. W. Brown, E. Field, F. R. Eirich, M. Szwarc, A. A. Sehon.

C. I. C. and National Research Council Sponsor Canadian High Polymer Forum

► Various aspects of polymer study were discussed at the Eighth Canadian High Polymer Forum, co-sponsored by the Chemical Institute of Canada and the National Research Council and held at Macdonald College on May 12 to 14. Several papers of interest to the rubber industry were presented at the six session event which was attended by approximately 150 delegates.

At the business meeting of the Forum, officers were elected including: *Chairman*, Dr. M. H. Jones; *Program Chairman*, Dr. L. A. McLeod; *Secretary-Treasurer*, Dr. K. E. Russell. It was also decided at this meeting that the Ninth Forum will be held in the Fall of 1959, at a location to be selected.

Talk Highlights Banquet

The Forum Banquet, held on Monday, May 12, highlighted a paper presented by Professor G. Gee (University of Manchester—England), who spoke on "Predicting Polymer Properties." Professor Gee said that in the early days of polymer chemistry, it was thought possible for a physicist to specify the properties he would desire in a polymeric product and for a chemist to define the molecular entities necessary to produce such properties. Experimental realization of this ideal, he said, has proved to be extremely difficult.

Professor Gee outlined briefly some of the properties which one would like to predict and the efforts of his research team to accomplish this goal. Professor Gee also discussed research directed at a study of the force fields surrounding a polymer molecule.

Among the papers featured at the regular technical sessions was "Radiochemical Study of the Termination Mechanisms in Vinyl Polymerizations," was presented by B. L. Funt and W. M. Pasika (University of Manitoba). The paper discussed C^{14}, tagged azobisisobutyronitrile, as an initiator in the polymerization of styrene, butyl acrylate and vinyl acetate monomers. The specific activity and the molecular weight of the resultant polymers were determined, making it possible to establish whether combination or disproportionation reactions were predominant in the radical termination steps of the systems studied.

Aromatic Vinyl Copolymerization

"Retardation and Copolymerization in Aromatic Vinyl Derivatives," by I. Schafer and F. R. Eirich (Polytechnic Institute of Brooklyn), the second paper, discussed the multifunctionality of vinyl benzoate in the copolymerization with vinyl acetate found by Ham, which the authors believed could best be explained by transfer schemes as postulated by Mayo, Price, Bartlett and their co-workers. They felt that this transfer with monomer is analogous to the copolymerization of vinyl acetate and benzene as postulated by Stockmayer.

P. B. Lumb (Polymer Corp.) delivered the next paper, entitled "The Copolymerization of Isoprene with Isobutylene." According to Mr. Lumb, expressions have been derived to relate monomer concentrations with the degree of polymerizations of a copolymer when certain termination reactions are postulated. He stated that these expressions have been simplified for the limiting condition of the first monomer concentration being small compared with that of the second. Work on this is being continued.

"Polymerization of Vinyl Monomers in the Presence of Polyisoprenes—The Mechanism of Peroxide Induced Graft Copolymer Formation," was presented by P. W. Allen, C. G. Moore (British Rubber Producers Research Association) and G. Ayrey (McMaster University). It was stated that benzoyl peroxide initiated polymerization of methyl methacrylate in the presence of polyisoprenes (e. g., natural rubber and gutta percha) leads to the formation of a graft copolymer containing vinyl polymer side chains grafted on to the polyisoprene backbone. Use of azo-iso-butyronitrile as initiator in comparable systems gives poly-(methyl methacrylate), but no graft copolymer, according to a paper by F. M. Merrett which appeared in Trans. Faraday Soc., in 1954. The authors said that this specific initiator effect and the mechanism of graft copolymer formation have been determined by using C^{14}—labelled initiators.

Hydrocarbon Polymer Protectants

Another paper entitled "New Protectants for Hydrocarbon Polymers," was delivered by W. L. Hawkins, F. H. Winslow, B. B. Loeffler and W. Matreyek (Bell Telephone Laboratories). The authors claimed that oxidation of most hydrocarbon polymers is a comparatively rapid process which may be initiated by heat or ultraviolet radiation. Degradation is evidenced by mechanical failure and increased dielectric loss. Addition of a few per cent of carbon black gives effective protection against ultraviolet radiation. Small amounts of an organic antioxidant, such as a secondary aromatic amine or a substituted phenol, are usually added to provide protection against thermal oxidation which might occur during processing or subsequent exposure.

Anionic Styrene Polymerization

A study of "Kinetics of Anionic Polymerization of Styrene" was presented by K. F. O'Driscoll and A. V. Tobolsky (Princeton University). It was stated that the kinetics of the polymerization of styrene initiated by n-butyl lithium (BuLi) in benzene and in benzene plus small amounts of tetrahydrofuran (THF) have been investigated. It was found that the rate of polymerization is independent of BuLi concentration over a 100-fold range in pure benzene. In benzene plus THF the rate is inversely proportional to the BuLi concentration. A reaction scheme was suggested to explain these unusual kinetic results.

"Some Data on the Reaction Mechanism of the Friedel-Crafts Polymerization of α-Olefins," was discussed by G. A. Olah, H. W. Quinn and S. J. Kuhn (Dow Chemical of Canada). The authors showed the direct correlation between the reaction mechanism and intermediate complexes of the aromatic Friedel-Crafts alkylations and of α-olefin polymerizations.

Polybutadiene Isomerization

A Golub (B. F. Goodrich Research Center) presented a paper entitled "The Radiation Induced Cis-Trans Isomerization of Polybutadiene." According to Mr. Golub, the cis double bonds in a high cis polybutadiene in solution are readily converted into trans double bonds when irradiated with gamma rays in the presence of a sensitizer such as a disulfide or a mercaptan.

A paper entitled "Rate of Crystallization of Polymers," was presented by G.

S. Trick. The author described the value of obtaining crystallization data on elastomeric or potentially elastomeric polymers, with reference to both the effect of crystallinity upon physical properties and to the possible use of crystallinity measurements for examining microstructure.

"Effect of Partial Coagulation Upon the Size Distribution in Polydisperse Latices," was presented by W. Heller, E. L. Rowe, R. L. Berg (Wayne State University) and J. H. L. Watson (Ford Institute for Medical Research). The authors discussed a series of investigations reported in the literature which show that the average particle size in colloidal solutions varies with the degree of coagulation. They felt that it is unfortunate that the results obtained are contradictory. A few authors find that large particles coagulate preferentially and others find the opposite.

It was felt that the techniques used do not appear to have been sufficiently powerful to allow a secure conclusion and this may be the real reason for the discrepancy of results. The results were discussed in the light of the prevalent theory of stability of colloidal solutions taking into account the important additional element of collision statistics.

Polystyrene In The Glassy State

J. F. Rudd and R. D. Andrews (Dow Chemical) delivered a study on "Photoelastic Properties of Polystyrene in the Glassy State. III. Styrene Derivatives and Copolymers." Following investigations of the effects of molecular orientation and temperature on the photoelastic constants (stress-optical and strain-optical coefficients and the elastic modulus) in Parts I and II, this paper investigated the effects of details of molecular structure on these same constants by studying several polystyrene derivatives and also copolymers of styrene with α-methylstyrene, methyl acrylate and methyl methacrylate, all at 70°F.

S. N. Chinai and R. A. Guzzi (Picatinny Arsenal) spoke on "Effect of Molecular Structure on the Dilute Solution Properties of Polymers". According to the authors, light scattering and viscosity measurements have been completed on the methyl, ethyl, n-butyl, n-hexyl, n-octyl and n-lauryl methacrylate polymers. Various dilute solution relationships and parameters were established and compared.

The last paper entitled "Heats of Mixing of Polyisobutylene in Some Organic Solvents," was presented by Claude Watters, Hubert Daoust and Marcel Rinfret (University of Montreal). The authors said that the integral heats of solution of solid polyisobutylene in nine organic solvents had been measured at 25°C. using a Tian-Calvet microcalorimeter, for concentrations up to 3 per cent in polymer.

Results of the experiments led to the formation of an equation which had been derived to account for the variation of the interaction parameter for a polymer-solvent pair with concentration and a series development of the volume fraction of the polymer was obtained. According to the authors, their data are treated accordingly so that an equation for the heat of mixing can be derived.

Skid Prevention Conference

► The First International Skid Prevention Conference, sponsored by the University of Virginia in cooperation with several technical and civic organizations, has been scheduled to be held from September 8 through 12 at Newcomb Hall, University of Virginia, Charlottesville, Va. The conference which has the ultimate objective of reducing skidding and skidding accidents, will bring together for the first time technical experts from the United States and abroad.

To be comprehensive in scope, the Conference will include the following general topics: "The Analysis of Accidents and the Human Element in Skidding"; "Informal Open Committee Meeting on the Subject of Accident Data and the Human Element in Skidding"; "The Analysis of Frictional Forces Necessary to Accomplish Stopping, Steering, and Acceleration. Relationship of Vehicular Design and Brake Design to Skidding"; "The Relationship of Tire Design and Composition to Skidding"; "Review of Laboratory and Field Methods of Measuring and Road Surface Friction"; "Informal Open Committee Meeting on the Subject of Laboratory and Field Testing Methods"; "Relationship of Road Surface Properties to Skidding"; "Informal Open Committee Meeting on the Subject of Road Surface Properties and their Relation to Skidding". On Friday, September 12, there will be a summary session at which each Conference subcommittee will report on: 1) Significant Conclusions Reached by the Conference; 2) Existing Deficiencies in Knowledge, and 3) Recommendations for a Program of Research to Remedy Deficiencies.

Members of Subcommittee C, which will report on "The Relationship of Tire Design and Composition to Skidding", have been drawn from major American tire companies. With J. H. Cox acting as chairman, committee members consist of William Denton (Goodrich); C. N. Dykes (Tire and Rim Association); W. C. Johnson (Goodyear); Louis Marick (U. S. Rubber); R. F. Miller (Goodrich), and C. F. Schwall (General Tire).

The registration fee includes the price of the banquet, to be held on Tuesday, September 9, and one copy of the *Proceedings* of the Conference. Registration will be limited.

Dow Acquires Extruders Inc.

► Dow Chemical Co., Midland, Mich., has acquired the common stock of Extruders Inc., Hawthorne, Calif., suppliers of polyethylene film to West Coast markets. The merger was made after consideration of the future potentials of the polyethylene film industry and is expected to be advantageous to all concerned. Basic operating and purchasing policies of Extruders will continue unchanged and the firm will remain under the same management with William B. Sander as president and John A. Croft as secretary.

Largest Rubber Mat Used In Circus

► What is said to be the largest mat ever assembled, was utilized by the St. Louis Police Relief Association for its annual circus in the St. Louis arena on April 24 to May 4. Manufactured by the U. S. Rubber Co., New York, N. Y., the mat consisted of 170 sections and covered more than 20 thousand square feet. Replacing sawdust formerly used in circuses, it eliminated the need for six inches of dirt beneath the sawdust and for obtaining the tanbark itself. In addition, mats are said to facilitate cleaning and to protect floors used for other events. The bright green mats are ⅜ inch thick, and have a non-slip pyramid design. The photograph above shows a circus crew laying out the 18½ tons of matting.

Walter D. Baldwin

Named Sales Department Head

► Walter D. Baldwin has been appointed vice-president in charge of the newly formed automotive sales department of the U. S. Rubber Co., New York, N. Y. With headquarters in Detroit, Mich., the new department coordinates sales to the automotive industry of the various products manufactured by all the operating divisions of U. S. Rubber. More than 130 different rubber, plastic and textile automotive products, such as tires, upholstery materials, foam rubber, parts for interior trim, dashboard crash pads, steering wheels, and a wide variety of rubber-to-metal mountings, will be handled by the new department. Mr. Baldwin, who was formerly assistant general manager of the Tire Division, started with U. S. Rubber in 1935 as a tire salesman in the Spokane, Wash. branch. In 1944, he was placed in charge of sales for the Gillette Tire Division and a year later was named sales manager for the U.S. Tires Division. In 1947, he became director of manufacturers sales and in 1957, he was named assistant general manager of the Tire Division. Mr. Baldwin is a native of California and a graduate of the University of California with a degree in business administration.

FMC Renames Division

► Food Machinery & Chemical Corp. of New York, N. Y., has renamed its Organic Chemicals Division as the Chemical and Plastics Division in order to reflect the unit's increasing concentration on resin and plastics work. A number of new resins and plastics are under active development and will shortly be offered for sale, company officials announced. In addition to "Dapon" resin (diallyl phthalate prepolymer), the new Chemical and Plastics Division produces allyl and methallyl monomers and a broad range of "Ohio-Apex" plasticizers as well as organic chemicals derived from phosgene and acetoacetic ester reactions. These include carbamates, chloroformates, carbonates, methyl ketones and substituted acetoacetic esters. The Chemical and Plastics Division maintains its headquarters at 161 East 42nd St., New York 17, N. Y., and plants are at Nitro, West Va. and Baltimore, Md.

Speeds Building Of Retread Units

► General Tire and Rubber Co., Akron, Ohio, has announced that the company will rush completion of its $3¼ million network of giant tire retread plants across the country as a result of President Einsenhower's authorization of a $1,800,000,000 increase in federal spending on highway construction this year. The president's action increased to $5½ billion the amount of approved spending this year on over-all federal-state road plans. Expected to create initially some 88,000 new jobs, the highway program could start a chain reaction giving the country confidence to combat the current recession according to a company official. The network of giant tire retread plants has key stations in Charlotte, N. C.; East Rutherford, N. J.; Kansas City, Mo.; Boise, Idaho; Corpus Christi, Texas; Los Angeles, Calif., and Akron, Ohio.

The East Rutherford plant was to have been dedicated on May 14, while the Los Angeles plant is being rushed to completion. The latter includes facilities both for the production of tread rubber and the retreading of giant tires used in highway construction. Designed specifically for the Federal Aid Highway program, each station in the network is located near a key highway route. The far-flung chain of retread services will provide uniform factory-controlled repair and retread services on giant tires and will be capable of handling the biggest tires produced. General Tire's Kraft system of recapping, a patented company process, will be used exclusively.

Goodyear Diamond Jubilee Tire

► Goodyear Tire & Rubber Co., Akron, Ohio, has introduced a new "Double Eagle" premium tire, reported to be the "best and most trouble-free tire it is possible to build." The tubeless tire is equipped with a sidewall valve to permit optional installation of the new "Captive-Air Steel-Cord Safety Shield." Resulting from more than two years of development work, the tire is engineered for today's higher-powered cars, improved roads, higher driving speeds and greater traffic density.

The new tire has been called Goodyear's "Diamond Jubilee Tire", and features 3-T nylon construction, considered to be 50 per cent stronger than that of standard four-ply nylon tires. It is preshaped to its inflated contour, thus relieving cord, body and tread tensions. The tread, compounded to withstand extreme heat and flex fatigue, is wider and deeper, and has new Z-pattern traction edges for maximum traction on all roads. Spokesmen state that the new Double Eagle offers increased mileage, adding up to 500 more miles for every thousand miles in an ordinary tire. A distinctive sidewall design provides cooling in the heavy tread shoulder and a double scuff rib protects the tire's Captive-Air sidewall valve and narrower white sidewall strip. The new Double Eagle is available in a full range of 14 and 15 inch sizes with Captive-Air Shields, covering the same ranges, available as optional equipment.

Joseph P. Fuller

Appointed Assistant Manager

► Joseph P. Fuller has been named assistant manager of the Eastern District of the Elastomer Chemicals Department of E. I. du Pont de Nemours & Co., Inc., with headquarters in Trenton, N. J. Mr. Fuller, who joined DuPont in 1946, has been a sales representative in the Eastern District office since 1947, specializing in sales to the wire and cable industry. Prior to that, he was a rubber chemist assigned to DuPont's rubber laboratory, where he handled service problems in the wire and cable field. Before joining DuPont, he had extensive experience in the wire and cable business with the General Cable Corp. He is a graduate of New York State Technical Institute at St. Lawrence University and is a member of the American Chemical Society and the New York and Rhode Island Rubber Groups.

Sun Asks 5-Year Moratorium

► Sun Rubber Co., Barberton, Ohio, has filed a petition in the U. S. District Court in Cleveland, Ohio, which requests that the company's creditors approve of a five-year moratorium on the debts it owes them. At present, Sun is negotiating for a merger to obtain necessary working capital. The plant has been shut down for several months. Under terms of the moratorium plan, Sun would pay all claims which are entitled to priority and also all secured claims. The petition says the firm is unable to meet debts as they come due and that relief through the moratorium is needed to enable the company to operate and resume business.

Grants Production Rights

► Dennison Manufacturing Co., Framingham, Mass., has announced that Peters Manufacturing Co., Wollaston, Mass., has been granted exclusive rights for the processing, application and sale of Dennison industrial crepe papers to the wire and cable industry. Peters has specialized for many years in the development of electrical cable products and the production and sale of coated and uncoated tapes, and is familiar with the technical problems of cable construction.

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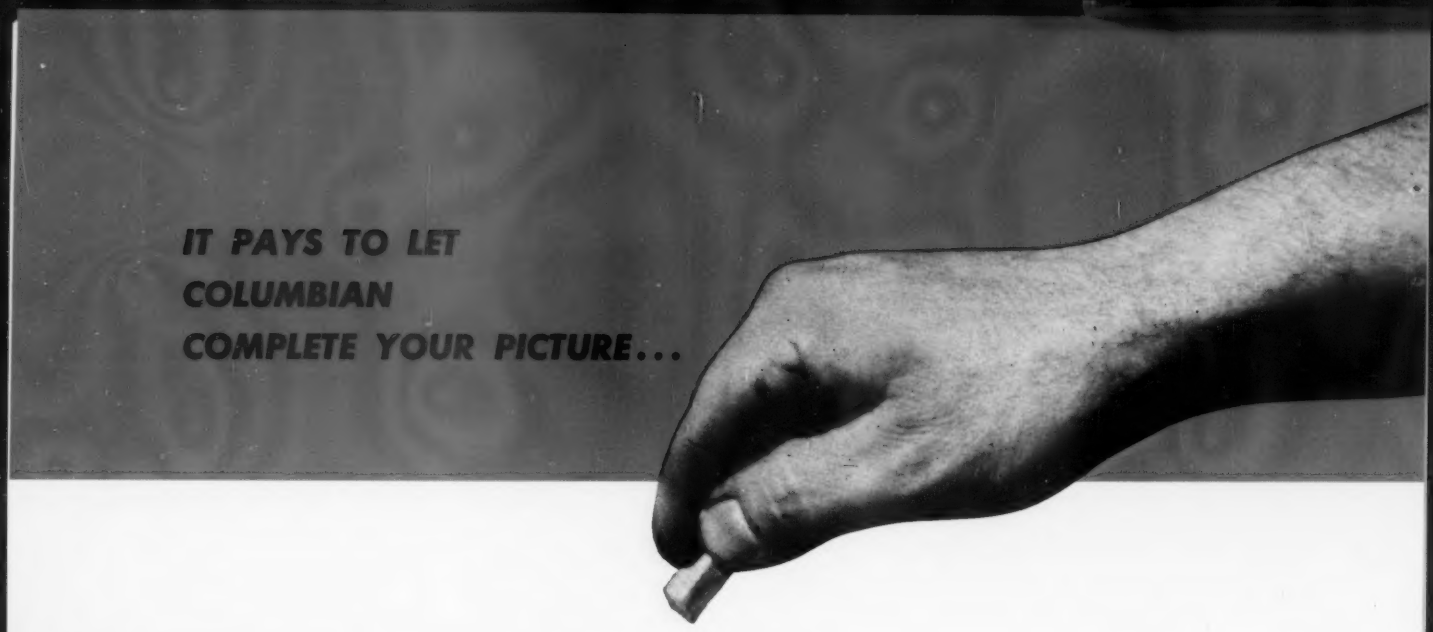

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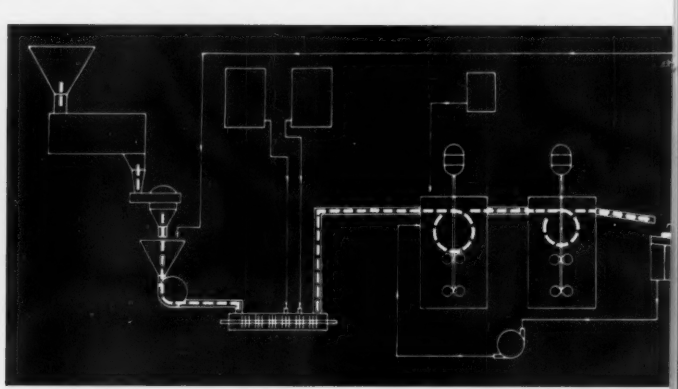

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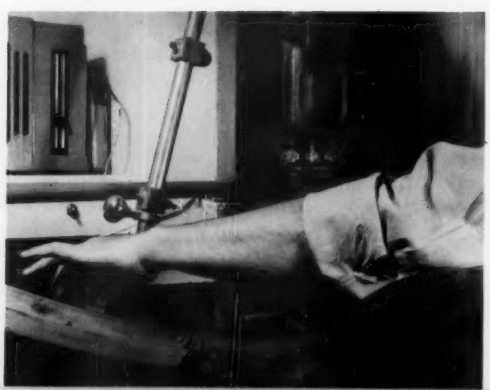

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Al Boehmer

Boehmer Joins Georgia Marble

► Calcium Products Division of the Georgia Marble Co., Tate, Ga., has appointed Al Boehmer, Jr., as sales representative in the South and Middle West. Mr. Boehmer, who will work out of the company headquarters in Tate, will represent the entire line of the Calcium Products Division. Prior to this appointment, Mr. Boehmer was plant manager of the Tower Paint and Manufacturing Co. and for eight years previous to that he was associated with the A. L. Boehmer Paint Co., Inc. Mr. Boehmer was educated at Xavier University, Cincinnati, Ohio, and Case Institute of Technology in Cleveland, Ohio.

National Lead Names Three

► Titanium Pigment Corp., New York, N. Y., has announced that Allen G. Davies has been named New York district sales manager. At the same time, Henry E. Melvin was transferred from Los Angeles to San Francisco, Calif., as senior sales representative and David A. Sonnenmair, Jr. was named sales representative in Los Angeles. Mr. Davies attended Cleveland College and was employed as a sales representative by Titanium Pigment in 1945 in Philadelphia, Penna. He was transferred to Portland, Ore., then to San Francisco in 1950 where he continued as a representative until his present appointment. He was formerly employed by Sherwin-Williams Co.

Mr. Melvin, who has a Bachelor's degree in chemistry from Georgetown University, joined Titanium Pigment in 1946 as a sales representative in New York City. He was transferred to Los Angeles the following year. Mr. Melvin was previously employed by the J. T. Baker Chemical Co. Mr. Sonnenmair has been a Titanium Pigment sales trainee in New York City since July of last year. He holds a B.S. degree in economics from the University of Pennsylvania and was first employed at the company's Baltimore branch in 1952.

FTC Charges Price Concessions

► The Federal Trade Commission has charged Firestone Tire & Rubber Co., Akron, Ohio, with granting illegal price concessions to a few large-volume customers. In a separate complaint, the F.T.C. charged Automotive Supply Co., Altoona, Penna., with using its strong bargaining power to get illegal price concessions from Firestone and other suppliers. Hearings on the complaints were scheduled before F.T.C. examiners in Washington on July 14 for Firestone and July 16 for Automotive Supply. The F.T.C. alleged that Firestone arbitrarily classified Automotive and a limited number of other heavy-volume buyers as "warehouse dealers" and gave them special price reductions. These lower prices, the complaint said, were achieved through a 5 per cent warehouse commission, special truck and carload discounts, quantity discounts on tubes, and freight payments.

For example, F.T.C. alleged, Automotive received $120,000 from special "warehouse commissions" in 1955 on purchases which it sold in competition with unfavored dealers. Automotive was charged with "knowingly inducing" special price concessions from suppliers through alleged misrepresentation and its strong bargaining position. The F.T.C. said Automotive's annual sales amount to nearly $10 million and the company is one of the largest wholesalers of tires, tubes, home supplies and auto products in its trading area.

Receives Italian License

► Pantasote Co. of Passaic, N. J., has been licensed to manufacture plastic packaging materials developed by the Compagnia Italiana Nest-Pack S.P.A., Bologna, Italy. To be marketed under the trademark "Panta-Pak" in this country, the new plastic packaging materials will be manufactured using the production methods, processes, and special machines built by the Italian firm. One of the first applications of Panta-Pak will be a nested tray, vacuum-formed from a kohinor resin sheet, of special advantage for the packing of such soft deciduous fruits as peaches, nectarines, plums, persimmons and fresh figs. One design of the Panta-Pak tray suggests the possible re-use of this material at terminal packaging plants as a consumer pre-pack for vine ripened tomatoes.

Stauffer Appoints Sales Manager

► Industrial Chemicals Division of the Stauffer Chemical Co., New York, N. Y., has appointed Wyman L. Taylor as western sales manager. Prior to his promotion, Mr. Taylor was administrative assistant to the vice-president, Pacific coast. A graduate of the University of California in chemical engineering, he joined Stauffer in 1946 and has had broad experience in selling both agricultural and industrial chemicals. Mr. Taylor will make his headquarters at San Francisco and will be in charge of Stauffer's industrial chemical sales in nine western states.

B. J. Skowronski

Joins Neville Chemical

► B. J. Skowronski, formerly associated with the Diamond Alkali Co., has been appointed to the Technical Service Department of the Neville Chemical Co., Pittsburgh, Penna. Mr. Skowronski had served as a rubber and plastics technical service supervisor for the SDC Division of Diamond Alkali. Previous to that, his experience included tire compound development with the Armstrong Rubber Co., and GR-S production supervision with the Naugatuck Chemical Division of the U. S. Rubber Co.

Diamond Alkali Carbium

► "Carbium", a new, low-cost grade of dense-type precipitated calcium carbonate, has been developed by the Diamond Alkali Co., Cleveland, Ohio, further broadening the company's line of precipitated calcium carbonates for the rubber, plastics and paint industries. Suitable for use as a filler in rubber compounds, Carbium provides fast mixing cycles, good dispersion and color stability, the company states. In addition, its high loading tolerance enables the material to be used in compounds where low modulus and low cost are essential product or processing requirements. Carbium is said to be fully adaptable for use as a filler for polyvinyl chloride resins meeting all the requirements of cost uniformity, processibility and color stability in all applications where these factors are principal considerations. The new material is also suitable as an extender for flat wall paints of both alkyd and resin emulsion types, the company states.

Named Appleton Representative

► Appleton Machine Co., Appleton, Wisc., has announced the appointment of Frank C. Arnold, formerly a sales engineer for Pusey & Jones Corp., as northeastern representative. Mr. Arnold, who has had 32 years of paper mill and papermaker's machinery experience, will make his headquarters in Henderson Harbor, N. Y., and will represent the company in New England and New York state.

Alan J. Woodfield

Sealol Personnel Changes

► Alan J. Woodfield has been named executive vice-president and will continue to serve as controller for the Sealol Corp., Providence, R. I. Mr. Woodfield, who joined the company last fall, had previously been associated with LaFavorite Rubber Co. as executive vice-president and general manager and before that, was a vice-president of the Continental Paper Co. The company has also announced that Justus B. Stevens has been named vice-president in charge of the newly formed Seals and Accessories Group; Frank Bottomly, vice-president in charge of the New Tools and Equipment Group; W. F. Holt, director of personnel and J. T. Colwell, Jr., manager of the Accounting and Cost Department. Sealol said that the changes in personnel had been made in order to put maximum concentrated effort behind the development of new products.

Goodyear Unisteel Tire

► Goodyear Tire and Rubber Co., Akron, Ohio, has developed a new type of over-the-road truck tire built of steel cords instead of fabric plies, which is said to have possibilities of up to three times greater tread mileage. Named the "Unisteel", the tire is composed of one steel cable ply running radially from bead to bead and reinforced by three diagonal steel breaker plies. The belted-type, locked-together construction permits the tread to roll on the road without the wearing, scrubbing movement usually encountered in over-the-road tires, Goodyear states. The "belted" construction can also result in greatly increased tread life and substantially reduced running temperature, up to 100°F. in certain operating conditions. Other advantages include a reduction in rolling resistance, increased resistance to puncture and cuts, improved cushioning and confinement of flexing to the tires' sidewalls. The tube-type Unisteel tire is being produced in sizes 7.50-20, 8.25-20, 9.00-20, 10.00-20, 11.00-20 and 10.00-22. Because the tire requires a radical departure from conventional methods of manufacture, production may be limited at present.

Holmes-Andre De-Bonding Process

► Keystone Rubber Products Corp., Buffalo, N. Y., has been appointed by W. C. Holmes & Co., Ltd., England, to manufacture and sell the Holmes-Andre De-Bonding Process and equipment in the United States. Holmes-Andre equipment is used primarily for the removal of bonded or cured rubber from metal parts. According to Keystone, many manufacturers use bonded-to-metal parts and, at present, remove rubber to restore steel for re-usage by outmoded methods.

This new method of de-bonding is based on the principle of destructive distillation in a closed vessel and in the absence of air. The charge of components weighing 10/15 cwts. is loaded into a container which is then placed in a vertical cylindrical retort, the cover of which is sealed down. A gas-fired furnace provides heat to distil rubber. Taking approximately seven hours, during which time the temperature is not allowed to exceed 500°C., the process permits the removal of rubber in gas, liquid or solid form. When the process is completed, the remaining metal parts are cleaned by a barrel tumbling procedure.

NBS Tests Extensometers

► The National Bureau of Standards, Washington, D. C. has released data on performance tests of extensometers and recorders used to determine the properties of metals. Conducted on three types of extensometer-recorder systems in current use, the tests indicate that such instruments are capable of meeting the requirements of government and industry. The investigation was undertaken to arrive at more functional adaptation and more effective use of equipment producing autographic stress-strain records of tensile tests. It included calibrations of stress and strain coordinates and the measurement of other characteristics which affect accuracy. A stress-strain recorder, which incorporates several operations in its performance, determines certain properties of materials by plotting a curve of stress versus strain on graph paper. The procedures developed in this work are being made available to industry to aid in the evaluation and calibration of individual recorders. Ask for Summary Technical Report 2229.

General Promotes Steinkerchner

► General Tire & Rubber Co., Akron, Ohio, has announced the appointment of Edward F. Steinkerchner, formerly in the company's Chemical Division, as a technical sales representative. A native of Akron, Ohio, Mr. Steinkerchner was graduated from the University of Akron with a bachelor of science degree in 1953 and was employed as a teacher by the Akron Board of Education until he joined General Tire. Mr. Steinkerchner served for two years as a 1st lieutenant in the U. S. Army and completed a year's service with the Ohio National Guard as a 1st lieutenant in the Anti-Aircraft Artillery. He is a member of the Junior Chamber of Commerce and the Knights of Columbus.

Francis C. Thompson

Thompson Joins Marbon Chemical

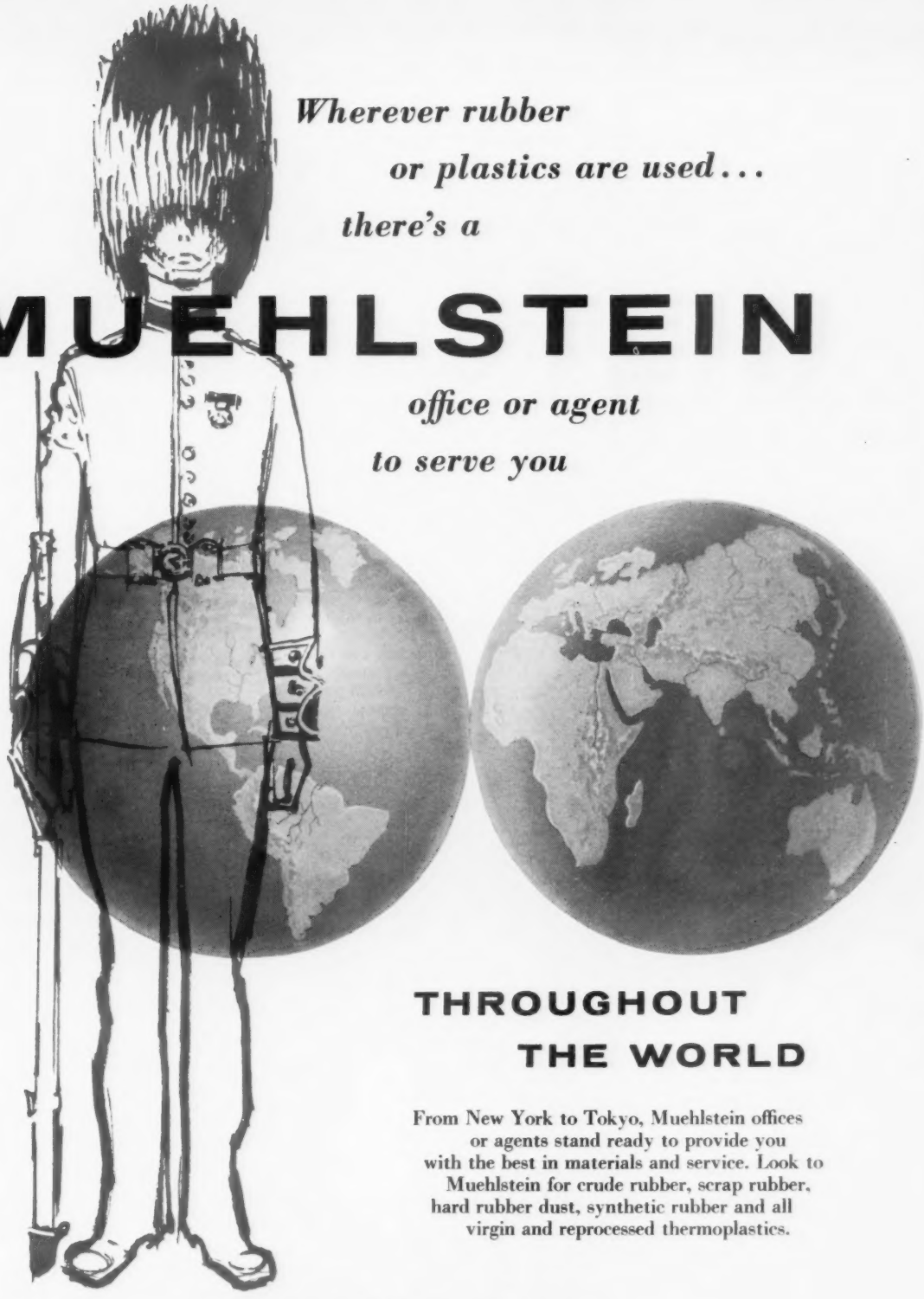
► Francis C. Thompson, formerly associated with Woodall Industries as a sales representative of interior trim to the automotive industry, has joined Marbon Chemical, a division of the Borg-Warner Corp., Gary, Ind., as a technical sales representative for the Indiana and western Michigan area. Before joining Woodall, Mr. Thompson sold plastic compounds and extruded sheets and shapes for the Sandee Manufacturing Co. He has a B.S. degree in chemistry from Kalamazoo College.

Introduces Two New Tires

► Pennsylvania Tire Co., Mansfield, Ohio, has announced the addition of the "Super Turnpike Roller" to its special purpose tire line and the "Turnpike Miler" to its truck tire line. The Super Turnpike Roller is of six ply rayon construction in the 7.50-15 size and was designed for use on highway building equipment. Its smooth flat tread rolls and packs road beds for the application of final surfacing. The Turnpike Miler will be available initially in super rayon construction with a five rib, saw tooth design. Equal in design, appearance and performance to most equipment level tires, it contains cap plies for added bruise resistance and greater strength and provides better retreadability at lower cost, the company states. The Turnpike Miler will provide a competitively priced unit in sizes 7.50-20 through 10.00-22. The tire is expected to be available in nylon construction within a short time.

Myers Joins Thiokol Chemical

► George Myers, formerly sales engineer for the Kelite Corp., Berkeley Heights, N. J., has been named technical representative in the Polyurethane Sales Group of the Thiokol Chemical Corp., Trenton, N. J. He was previously employed as a sales representative by the Sherwin-Williams Co., Philadelphia, Penna. A resident of Hopewell, N. J., Mr. Myers attended Rider College in Trenton. He is a member of the Hopewell Boro Council.



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S. Robinson Foster

Named DuPont Representative

► S. Robinson Foster has been named technical sales representative for the Elastomer Chemicals Department of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. With headquarters located in the Akron, Ohio, district sales office, Mr. Foster will work with customers in eastern Ohio, western Pennsylvania, and in parts of Maryland, West Virginia and New York. Mr. Foster, a native of Scarsdale, N. Y., holds a Bachelor of Science degree in mechanical engineering from Princeton University. He joined DuPont in August 1951 as an engineer at the Yerkes cellophane plant in Buffalo. After working on technical assignments at Buffalo on cellophane and polyethylene, he moved to the Circleville, Ohio plant where he worked on "Mylar" polyester film. In 1955, Mr. Foster became a personnel placement representative in the company's Employee Relations Department, assigned to the New England district. He was named technical representative in the Elastomers Laboratory at Chestnut Run near Wilmington in 1956.

General Rock Rib LCM Tire

► General Tire & Rubber Co., Akron, Ohio, has introduced what is said to be a rugged new tire for use in rough terrain by the construction, mining and logging industries. Called the "Rock Rib LCM", the new tire is constructed of Nygen cord and has an ultra-heavy ribbed tread with a variable slope in the groove design, which is said to aid in ejection of stones and rock fragments. The thick tread and shoulders consist of a specially compounded, cut-resistant rubber stock, and four Nygen cord shock plies buttress the 12 to 20 ply tire body. The Rock Rib was designed for use on front wheels of quarry, logging and earthmoving equipment as well as other heavy equipment operating in rugged terrain. According to General, this tire provides maximum steering ease and reduces side slippage. The Rock Rib LCM comes in sizes 10.00 x 20 through 14.00 x 25.

Gates Rubber Appoints Three

► Gates Rubber Co., Denver, Colo., has reorganized its Traffic and Purchasing Departments to function as a single unit under the direction of Harry Brown, formerly vice-president in charge of purchases. The company has also appointed Virgil Wall, previously assistant traffic manager, as traffic manager, and Tom Paterson, who has served as assistant director of purchases, as purchasing agent. The new appointments fill organizational vacancies caused by the retirement of William H. Button, vice-president in charge of traffic, and J. H. Crary, vice-president in charge of tire sales.

Mr. Brown joined Gates in 1936 as a clerk in the Production Department, becoming assistant supervisor of the materials section in 1938. He was named a production specialist in 1941, supervisor of production planning in 1946, and assistant production manager in 1951. During World War II, Mr. Brown also served as consultant to the National Rubber Director and the Civilian Production Authority. In 1951, he worked as a deputy NRA rubber director. Mr. Wall joined Gates 25 years ago as a clerk in the Warehouse Division and became assistant traffic manager in 1941. Mr. Paterson joined the company in 1944 as a purchasing expediter. He became a buyer at the end of the war, was later named purchasing supervisor, and became assistant director in 1951. Last year, Mr. Paterson was district vice-president of the National Association of Purchasing Agents.

Borden Promotes Sullivan

► Borden Chemical Co., New York, N. Y., has announced that Eugene J. Sullivan, formerly vice-president in charge of sales, has been named executive vice-president, succeeding H. H. Clarke, Jr., who recently left the company to become president of Dyna-Therm Chemical Corp., Culvert City, Calif. Mr. Sullivan started with Borden as a packaging adhesive salesman in 1946 and two years later became assistant manager of this department. In 1954, he became general manager of the Resins and Chemicals Department and in 1956, he took on the added responsibility for the Polyco-Monomer Department. Mr. Sullivan is a graduate of St. John's College and holds a Master's degree in business administration from New York University. He served for four years as a lieutenant in the United States Navy.

Geigy Names Sales Representative

► W. F. Bliss, Jr. has been named technical sales representative at Houston, Texas for the Geigy Industrial Chemicals Division of the Geigy Chemical Corp., Ardsley, N. Y. Mr. Bliss was formerly district sales representative for National Aluminate Corp. A World War II veteran, he holds degrees in chemistry and biology from Marquette University and the University of Chicago. Mr. Bliss is a member of the American Chemical Society, the National Association of Corrosion Engineers, and the American Association for the Advancement of Science.

William F. Lamela

Celebrates 40th Anniversary

► William F. Lamela, manager of production control on the staff of the vice-president of manufacturing for the Okonite Co., Passaic, N. J., is celebrating his 40th year with the firm. Mr. Lamela began his career in 1918 as a lab boy in the chemistry laboratory at the Passaic plant. During this time, he also studied chemistry at Brooklyn Polytechnic Institute during the evening and was later appointed a chemist. In 1943, Mr. Lamela became technical manager of the research laboratory and in 1951, he was named assistant to the late E. D. Youmans, then vice-president in charge of manufacturing and research. He was appointed to his present position in 1954. A member of the American Chemical Society and the New York Rubber Group, Mr. Lamela served on the technical Advisory Committee on shipboard cable for the U. S. Navy during World War II.

Named Swan Technical Director

► A. E. Williams, formerly factory manager for the Rubber Hose and Extruded Products Division of the Swan Rubber Co., Bucyrus, Ohio, has been named technical director for the company, while Leo Roth, previously product development and quality control manager of the division has been named assistant technical director. F. A. Bartos has been appointed factory manager for the Rubber Hose and Extruded Products Division, succeeding Mr. Williams. Mr. Bartos joins Swan after several years' experience in the Industrial Products Division of the B. F. Goodrich Co., Akron, Ohio. He is a graduate of Case Institute of Technology.

Firestone Appoints Girton

► Firestone Tire & Rubber Co., Akron, Ohio, has appointed Robert L. Girton, previously division manager of material preparation in Plant 1, as production manager of that plant. Mr. Girton, who joined the company in 1951 as an assistant foreman, was graduated from Temple University in 1950. R. A. Black has been named to succeed Mr. Girton as division manager of material preparation and T. E. Judy will manage the calendering room, stock cutting and bead department.

NEW IDEA LAB

FOR RUBBER & PLASTIC

• This Process Laboratory in Akron, Ohio is a birthplace of new ideas in rubber and plastic. Here we develop basic machines, such as automatically operated mills and processing screw extruders to:

1. **Produce more products per man-hour.**
2. **Produce products of higher quality.**
3. **Produce products with new and different material formulations.**
4. **Produce new end products.**

New materials, new processes and new products require new machines and new thinking. Wherever your horizons lead you, this Laboratory could possibly supply some of the answers. Your new idea or idea yet to be born can mature here. Outline your thinking by phone or letter and we will go to work.

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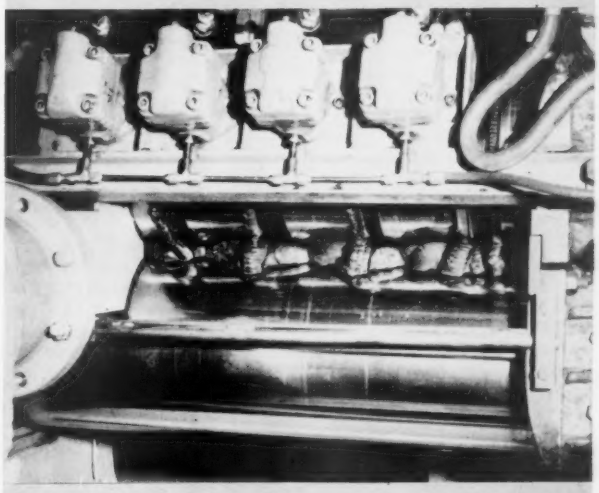
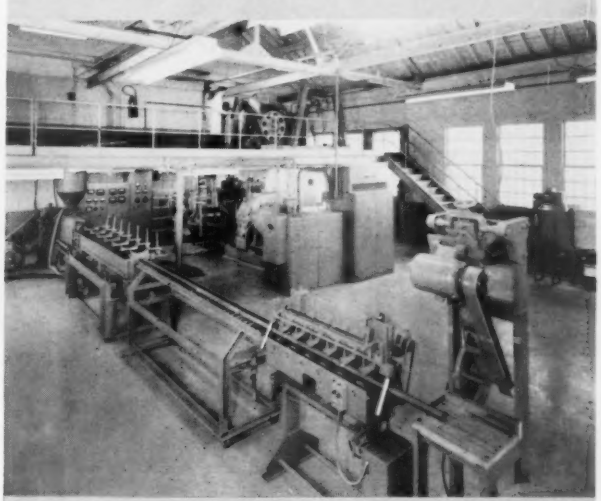


The Continuous Automatic Mill dispenses pigments and plasticizes uniformly without manual attention.



We specialize in screw machines for processing, blending, reclaiming, or devolatilizing.

Hercules Personnel Changes

► The Rubber Chemicals Division of the Paper Makers Chemical Department, Hercules Powder Co., Wilmington, Del., has announced the appointment of Robert W. Little as assistant sales manager. At the same time, David I. Johnston was named manager of the department's Akron sales office, and Robert W. Turner, sales representative at the Akron office. Dr. Little, formerly manager at the Akron sales office of the Rubber Chemicals Division, joined Hercules in 1948 as a research chemist at its Research Center. Later, he was transferred to the Sales Research Division, and in February, 1953, he was assigned to sales work in the Paper Makers Chemical Department. Dr. Little is a graduate of Rutgers with a B. S. in chemistry and obtained a Ph. D. in chemistry from Columbia.

Mr. Johnston joined Hercules in 1951 after graduating from Rensselaer with a bachelor's degree in chemical engineering. He later obtained a master's degree in business administration from the University of Delaware. From 1951 to 1954, he worked at the Research Center and then became a technical service representative in the Paper Makers Chemical Department. For the past five months, he has been technical sales representative in the Akron office. Mr. Turner, a graduate of Yale with a bachelor's degree in chemical engineering, joined Hercules in 1951. After two years at the Research Center, he was transferred to the Paper Makers Chemical Department's Kalamazoo, Mich., sales office. In March, 1956, he returned to Wilmington as the Department's technical sales representative.

Goodrich Vice-President Retires

► J. A. Hoban, vice-president for marketing at the B. F. Goodrich Co., Akron, Ohio, retired on May 31 after 39 years of service with the firm. A native of Cincinnati, Mr. Hoban attended Xavier University and the University of Cincinnati, where he was graduated with a law degree. He joined Goodrich in 1919 as a sales representative in the Cincinnati, Ohio area, after service as a naval officer in World War I. During his career with the company, he served as assistant manager of the Cincinnati tire sales district, manager of the Pittsburgh district and zone manager of tire sales at Chicago. In 1933, Mr. Hoban went to Akron as merchandise manager for the Goodrich Retail Division and later was named manager of retail sales. He was general manager of tire merchandising when he was made vice-president for sales in 1953 for the B. F. Goodrich Tire Co., a division of the parent firm. Mr. Hoban was elected to his present post in 1956. He is a director of the Inter-Industry Highway Safety Committee.

► Metal Hydrides, Inc., has appointed T. C. Ashley & Co., Inc., Boston, Mass., as New England sales and distribution agents to sell and service M. H. I. products used by the New England rubber, plastics and paint industries.

West Coast News

► Karl L. Rohde, Jr., has been named sales representative for organic chemicals in southern California for the Dewey and Almy Chemical Co. Mr. Rohde, whose headquarters will be in Los Angeles, will serve Dewey and Almy's customers in the paint, paper, adhesive, textile and plastics fields. A 1947 chemistry graduate of Harvard, he has been with the company for six months at its Cambridge, Mass., headquarters. Formerly, he was with the sales staff of the G. D. Searle Co., Chicago, Ill., and was sales and advertising manager of Precision Metal Products, Inc., Stoneham, Mass. Mr. Rohde is a member of the Society of Plastics Engineers and the Technical Association of the Pulp and Paper Industry.

► Henri V. Krakowski and Gene L. Unterzuber have been appointed to fill two new positions as rubber technologists on the laboratory staff of the Oliver Tire & Rubber Co. of Oakland, Calif. The appointments have enlarged the technical staff, enabling Oliver Tire to continue expansion in industrial rubber development and advancement in tread rubber research. Mr. Unterzuber, a graduate chemist from Bethany College, West Va., joins the company with previous experience in tread rubber and tire compounding. Mr. Krakowski joins the organization with a background in specification rubber compounding in precision molded goods. He is a chemical engineering graduate from the University of Zurich, Switzerland.

► The Los Angeles Rubber Group enjoyed a diversified schedule at its Annual Summer Outing, a Desert Caravan to the Desert Inn and the New Frontier Hotel in Las Vegas, held on June 6, 7 and 8. A full program of activities was offered on Saturday, including community breakfast; a variety of sports; the Hoover Dam Tour, and Luncheon at the Ramona Room at the New Frontier Hotel. An evening dinner and show was the highlight of the day. The outing was officially closed on Sunday with a brunch and the distribution of prizes.

► Master Processing Corp., Lynwood, Calif., has acquired the services of Paul Weber as office manager of the firm.

► Carl Dahlman of Dahlman Products Co., Redlands, Calif., has announced the entry of the firm into the production of molded vinyl products.

Polyurethane Production Planned

► Profile Rubber Products, a branch of the Davidson Rubber Co., Charlestown, Mass., has announced plans for the production of polyurethane for use by the automotive industry. The new operation is expected to begin in August.

BRI Meeting To Discuss Flooring

► The Building Research Institute Conference, scheduled for September 17 and 18 at the Sheraton-Park Hotel, Washington, D. C., will present a series of reports in the field of flooring design, manufacture and installation and evaluate the results of one of the largest surveys ever attempted on problems encountered with resilient, smooth surface flooring. BRI has circulated more than 7,000 questionnaires calculated to provide data on the appearance, comfort and service characteristics of seven types of floor covering, and experience encountered with every kind of flooring system.

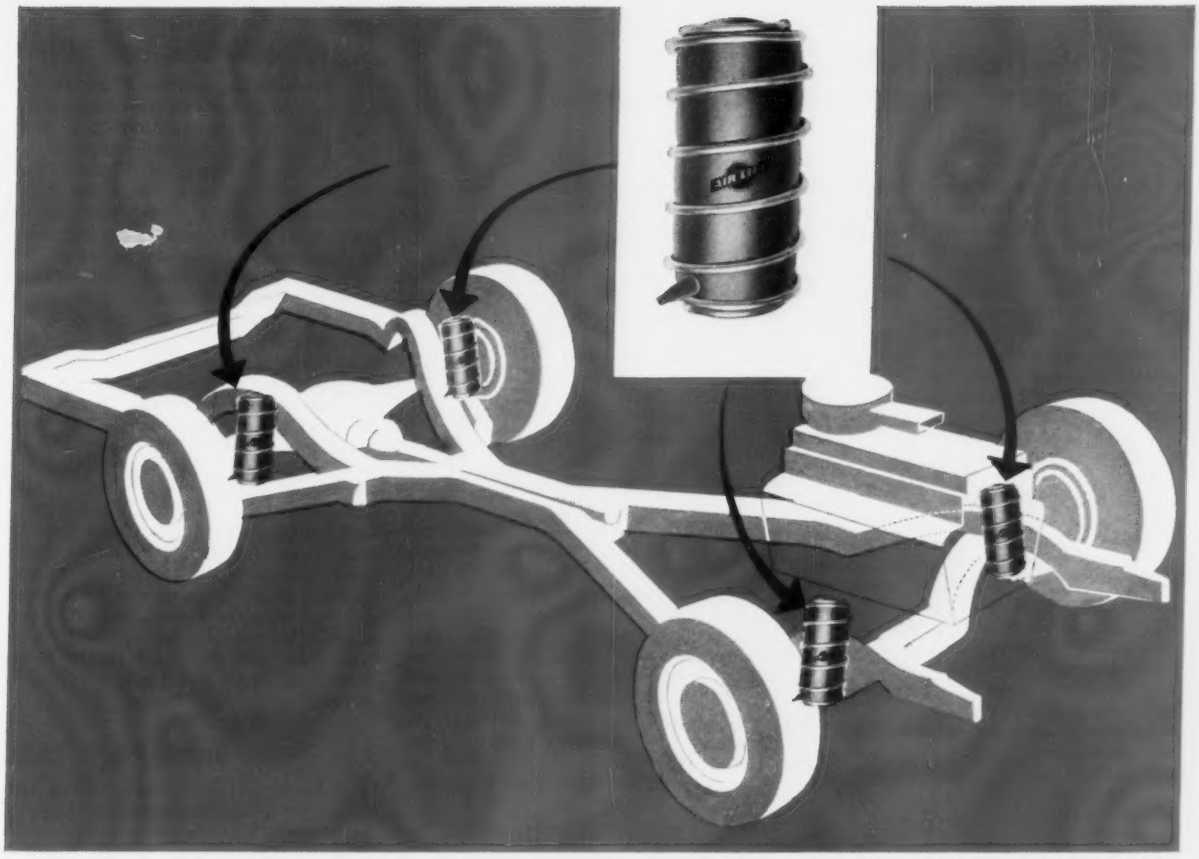
Also in preparation for the meeting is a document, in chart form, indicating the comparative numerical values for physical properties of various types of resilient flooring materials. Open to the entire building industry and related professions, the conference should set up a broad range of new guideposts to the design and construction of flooring systems and to the selection, installation and maintenance of resilient, smooth surface materials. Program and registration information may be obtained by writing Harold Horowitz, technical secretary, Building Research Institute, National Academy of Sciences, 2101 Constitution Ave., Washington, D. C.

Goodrich Promotes Taylor

► J. Terry Taylor, formerly manager of fuel cell operations for B. F. Goodrich Aviation Products, has been appointed manager of product service and field engineering for the B. F. Goodrich Tire Co., Akron, Ohio. A graduate of the University of Kentucky, Mr. Taylor joined Goodrich 19 years ago as a member of the works laboratories. Later, he moved to the Tire Division as a test engineer and then served as technical group head in industrial tire construction. In 1945, he joined the Field Engineering Department, where he worked on engineering problems in Akron and Detroit with automobile manufacturers. In 1951, he was named manager of the Track Department and he became section manager of field engineering for the Tire Division in 1954. Mr. Taylor was appointed technical manager of fuel cell design and engineering in aviation products in 1955 and the following year, he became manager of fuel cell operations.

Humble Oil Closes Refinery

► Humble Oil and Refining Co., an affiliate of the Standard Oil Co. (N. J.), has closed its butadiene unit at the Baytown, Texas, refinery for "an indefinite period." A company spokesman said the plant had been closed because of "continuing low demand for butadiene as an ingredient in synthetic rubber and other chemical uses." The 100 employes at the butadiene unit have not been transferred to other departments, the company said. A portion of the equipment in the butadiene unit, the company added, will temporarily be used to produce small quantities of other chemical raw materials.



Pneumatic Spring Controls are made with Enjay Butyl to provide quieter, softer cushioning in automobiles

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Enjay Butyl Rubber is used by the Armstrong Rubber Company, West Haven, Connecticut, in the production of Air Lift Pneumatic Spring Controls for the Air Lift Company, Lansing, Michigan. Butyl Air Lift units are inserted between leaf spring and frame to support overloads and cushion all moving parts of suspension. Inflatable to meet load requirements, these units protect vehicles–provide a smoother, safer ride.

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Canadian News

► The Rubber Association of Canada, at its recent annual meeting, forecast the outlook for the industry in 1958 and reviewed gains and losses made in 1957. The group believes that in 1958, consumption of new rubber will amount to some 87,000 long tons, down about two per cent from 1957, although even this tonnage is not expected to be achieved unless there is a marked rise in the rate of consumption in the second half of the year.

The Association's annual report stated that the industry has suffered due to severe and damaging import competition in the rubber footwear field and a gradual spreading of competition in other fields of rubber production. Another unfavorable factor cited was an unusual combination of weather conditions which had reduced the sale of rubber footwear, causing sales to fall to their lowest level in the post war years. Publication of the Tariff Board report on the rubber footwear industry's import problem, was followed by a directive to the Tariff Board to prepare a supplementary report making recommendations for such tariff action as was deemed warranted.

Greig B. Smith, manager and secretary of the Association, stated that rubber imports have hampered efforts of Canadian rubber producers to provide increased employment during 1957. The rubber industry, he said, had experienced a reduction in demand for rubber articles, but that despite this, imported rubber products continued to flood the market. Ira G. Needles, retiring president of the organization, stressed that "the dollar earned by a Canadian worker is more important than pennies saved on the purchase of foreign-made goods." He stated the belief that it is vital to give the Canadian workman "prior consideration in the domestic market."

Members of the Rubber Association elected J. P. Anderson, president of Dunlop Canada, Ltd., as president of the organization. Other officers elected include C. E. Joslin, *vice-president;* W. H. Mason, *treasurer,* and Greig B. Smith, *manager and secretary*. Those elected to the board of directors were R. C. Berkinshaw (Goodyear); T. M. Mayberry (Firestone); John Miner (Miner Rubber); Ira G. Needles (Goodrich); M. O. Simpson, Jr. (Gutta Percha & Rubber), and C. C. Thackery (Dominion Rubber).

► Cryovac Co., a division of W. R. Grace & Co. of Canada, Ltd., has opened a modern 80,000 square foot manufacturing plant which is located west of Toronto. The plant, which employs 200 workers, will make plastic film containers used in vacuum seal packaging of poultry and other foods going into cold storage. Cryovac first entered Canada in 1954 and occupied leased premises in Toronto until this year. A spokesman for Grace said the firm has been attracted to Canada by the rapidity of industrial growth in that country, particularly in the fields of chemical, petroleum and food processing.

► Chemical Institute of Canada has announced that Cecil E. Carson has been elected president of the organization, while E. Gordon Young has been named vice-president. Mr. Carson, a director of Imperial Oil, Ltd. since 1945, has been with that organization since 1923. Mr. Young is director of the Atlantic regional laboratory of the National Research Council.

► John W. Hammond, of Gutta Percha & Rubber, Ltd., has been named president of the Purchasing Agents' Association of Toronto.

Rubberized Concrete Mix

► A liquid rubber that is blended with dry concrete mixes in place of water has been developed by the Naugatuck Chemical Division of U. S. Rubber Co., Naugatuck, Conn. Called "Laticrete," it forms a tightly-bonded concrete mortar that has good adhesion and will cling even to old concrete surfaces without the chipping and roughing usually needed in concrete repair jobs. Naugatuck officials said that Laticrete dries hard and virtually dust-free with better water and weather resistance than standard concrete and has a bounce—or resilience—approaching that of a hardwood floor. Weekend handymen can use the rubber-concrete mortar for patching cracks in masonry, setting flagstones, or pointing brick or stone walls. Damp or dusty concrete walls and floors can be resurfaced with the material which can be applied in a thin but durable coating, the company said.

Supplement To ASTM Standards

► The "1957 Supplement to the Book of ASTM Standards Including Tentatives, Part 6", has been issued by the American Society for Testing Materials, 1916 Race St., Philadelphia, Penna. The volume contains the revised standards and the new and revised tentatives of rubber, plastics, electrical insulating materials, electronics materials and carbon black since the 1956 Supplement to the 1955 Book of ASTM Standards. Consisting of 423 pages, the volume includes 70 standards covering rubber products (chemical, physical, aging and low temperature tests); automotive and aeronautical rubber; packing and gasket materials; hose; insulated wire and cable carbon black; electronics materials; plastics (specifications; strength; hardness, thermal, optical and permanence properties; analytical methods, molds and molding processes, definitions and nomenclature).

Builds Fabric Tread Jet Tires

► B. F. Goodrich Aviation Products Co. of Akron, Ohio has announced that high-speed "Fabric Tread" aircraft tires have been specified as standard equipment by the Convair Division of General Dynamics Corp. for the F-106 "Delta Dart" jet fighter. Goodrich officials said that in extensive tests at Edwards Air Force Base in California, the new tire withstood the stress of high-speed takeoffs and landings which had worn out other jet tires. In the Fabric Tread tire, the company utilizes a new production innovation wherein laminated plies of nylon cord are built into the rubber stock to equalize the modulus between tread and carcass. This reduces the heat usually generated when high-speed takeoffs or landings cause flexing between the tread and carcass, they explained. The new tire has a special dimpled tread design that permits more uniform distribution of the fabric in the tread, helps eliminate stress points in the tread, and gives extra resistance to cutting and chipping. In another test, Goodrich said that the Fabric Tread tire outlasted other jet tires five to one in trials conducted with the F-104, a jet fighter manufactured by the Lockheed Aircraft Corp.

Rubber Irradiation To Be Studied

► A Senate House Atomic Energy subcommittee has given preliminary approval to plans for increased experiments to determine how atomic heat affects rubber and plastics. Under study is the Atomic Energy Commission's request for construction projects totaling $193,379,000 in the year beginning July 1. The rubber and plastics project would cost $1,600,000. A spokesman for the AEC Office of Industrial Development stated that laboratory experiments have already proved to scientists' satisfaction that atomic irradiation can change practically every property of plastics and has tremendous potential for rubber. He believed that irradiation could improve wearing and weathering properties in certain plastics and could achieve the equivalent of vulcanization in rubber without the use of heat. The problem now, he said, is to build a plant and expand experiments to a scale which would show whether industrial use of irradiation in rubber and plastics industries would pay off economically.

Sarbach Joins Goodrich-Gulf

► Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio, has appointed Donald V. Sarbach as director of new product development. Mr. Sarbach, formerly associated with Hewitt-Robins, Inc., Stamford, Conn., as director of research, has been associated with the rubber industry in various research and development capacities for 20 years. A native of Nebraska, Mr. Sarbach was graduated from the University of Nebraska in 1934 with a B. S. degree in chemistry. He is a member of the American Chemical Society, the Rubber Division of A. C. S., and the Akron, New York and Connecticut Rubber Groups as well as several other organizations.

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Thin Polyethylene Film

► Polyethylene film of unprecedented transparency and gloss—almost entirely free of the haze common to plastic films—is being produced on laboratory-scale equipment by engineers and lab technicians of the U. S. Industrial Chemicals Co. of New York, N. Y. The new film was made from "Petrothene 205", a resin developed by U.S.I. especially for production of low-gauge film. This resin has a density of 0.924, a melt index of 3.00, a torsional stiffness of 45,000 and excellent pull-down properties. The photograph above shows a 2/10ths of a mil thick film which was developed by U.S.I. from "Petrothene 239" which is believed to be the thinnest film ever extruded successfully. This blown polyethylene film is so thin and light that it can be floated on air like a feather. Using an unconventional processing technique called casting, production is accompolished on extrusion coating equipment rather than standard film extruding equipment.

Cast film is produced on conventional paper coating equipment, generally with only little modification. In the process, polyethylene film is extruded from the die onto a chrome plated chill roll. This casting step greatly improves the optical characteristics of the film by removing surface uneveness from the drawn sheet which is forced to follow the contour of the highly smooth roll. In addition to improving surface control, the casting technique reduces formation of haze producing crystals in the matrix of the polyethylene. These crystals occur as the film cools—more with a gradual cooling rate, less

with rapid cooling. In casting, the film is kept at a high temperature until it hits the chill roll where immediate and even quenching is provided, which contributes to vastly improved clarity.

In a space of three years, U.S.I. has advanced from a non-producer of polyethylene resins to its present position of third largest in the field. Commencing with the production of 26 million pounds in 1955, the company increased its output to 50 million pounds in 1956 and 100 million in 1957. This represents a total increase in the neighborhood of 400 per cent—and according to statistical projections made by the company, the present year promises further growth.

Kel-F Latices Introduced

► First availability in two latex forms of a fully-saturated halofluorocarbon rubber intended for industrial applications requiring extreme resistance to corrosive chemicals and heat has been announced by Minnesota Mining and Manufacturing Co., St. Paul, Minn. Introduction of the latices, named "Kel-F 820" and "Kel-F 5500", marks the first time that a synthetic rubber has been produced in stable, high-solids dispersions that are capable of withstanding 400 to 500°F. temperatures and strong oxidizing agents such as propellant-grade red fuming nitric acid and 90 per cent hydrogen peroxide, according to the firm. Until now the copolymers of chlorotrifluoroethylene and vinylidene fluoride made by the 3M Chemical Products Group and known as Kel-F brand elastomers, have been available only in gum or resin form.

Kel-F brand elastomer 5500 latex now makes possible the solution of many high-temperature rubber problems where dry-milled compounds and solvent cements have proved impractical, the company said. The latex may be applied by casting, dipping, or coating on fabric. The other dispersion, Kel-F brand 820 resin latex, has been designed for application where high-solids content, freedom from flamable vapors, and entrapped solvent are especially desirable, 3M said. It, too, may be applied by casting, dipping, or other methods common to latex technology. The 820 latex contains the same chemical groups as the 5500 latex, according to 3M, and thus affords opportunities for vulcanization or cross-linking of the linear chains to form a more stable network. The company added that both latices have been stabilized and concentrated so that further compounding, application and vulcanization are relatively easy for the experienced latex fabricator.

Divisional Setup Realigned

► Manufacturing and marketing of the product lines now handled by the Barrett Division of the Allied Chemical Corp., New York, N. Y., in the future will be handled by two separate divisions. Barrett's long-established lines of roofing, building and paving materials will be separated from the plastics and coal chemicals and will continue to be manufactured and sold under the Barrett Division name. The manufacture and sale of plastics, resins and industrial chemicals will be conducted by the Plastics and Coal Chemicals Division. T. J. Kinsella, head of Barrett since 1952, will be the president of that division.

H. Dorn Stewart will be appointed president of the Barrett Division. Mr. Stewart, who was formerly with Armstrong Cork Co., joined Allied in April of this year as assistant to the executive vice-president. This change will make possible intensified concentration on research, customer service and the development of specialized markets for each of the product lines involved, company officials explained. They said Allied's growing stake in plastics and the potential from new building materials facilities will be considerably strengthened by this realignment.

USDA Awards Announced

► U. S. Department of Agriculture has announced that Dr. Leon A. Goldblatt and Gordon S. Fisher have jointly received the Superior Service Award for the development of a process for the manufacture of synthetic rubber. Today, more than 750,000 tons of high-quality synthetic rubber valued at over $350 million, is produced through this process employing menthane hydroperoxide as a catalyst. The catalyst compound is produced from turpentine. This and similar turpentine compounds are used in the production of other types of synthetic rubber and a number of plastics.

Mueller Makes European Tour

► Dr. Hans J. Mueller, consulting chemist and engineer, 451 Deming Place, Chicago, Ill., left for Europe on June 1 for an extensive tour of the Western European countries. Dr. Mueller, a professor of chemistry at the University of Illinois has been active in the rubber field, both in the United States and abroad, for 25 years. Companies and individuals interested in European business or manufacturing methods are invited to contact Dr. Mueller in care of Dr. Bickel, Berg Strasse 4, Kassel-Wilhelmshoehe, Germany, U. S. Zone.

Goodrich-Gulf Expands

► Goodrich Gulf Chemicals, Inc., Cleveland, Ohio, has announced a million dollar expansion of production facilities at the company's synthetic rubber plant in Institute, West Va. The expansion will increase the plant's production of crumb rubber, a product that has won general acceptance among manufacturers of cements, mastics and adhesives. An extruder dryer for production of high quality extrusion-dried electrical grade rubber and other special polymers will also be installed. Construction began June 1 and is scheduled for completion by September 1.

Hooker Announces Name Change

► Hooker Electrochemical Co., Niagara Falls, N. Y., has changed the company name to the Hooker Chemical Co., in order to more accurately represent the firm's wide variety of chemicals and chemically-made plastics. The company has also announced the consolidation of the Shea Chemical Corp. into the organization. Vincent H. Shea, formerly president of Shea Chemical, has been elected a director of Hooker.

Obituaries

Kurt Alder

► Professor Kurt Alder, a former department head of the I. G. Farben chemical combine and a co-winner of the 1950 Nobel Prize in Chemistry, died on June 20 in Cologne, Germany. He was 55 years old. Professor Alder studied chemistry in Berlin and later at Kiel University, where he received a doctorate in 1925. He became a professor at Kiel in 1934. As director of research for one of the plants of the I. G. Farben industries, Professor Alder applied the results of his basic research to technical problems related to plastics. He was named director of the Chemical Institute at the University of Cologne in 1940.

Professor Alder and Professor Otto Diels, who died four years ago, shared the Nobel Prize for pioneer work in the synthesis of hydrocarbon compounds. The German scientists did research on the role of dienes in the synthesis of complex organic molecules. Their basic discoveries resulted in much progress in the manufacture of synthetic materials such as rubber-like substances, plastics and dyes. The scientists published the results of their discoveries on diene synthesis in the late 1920's.

Robert McC. Johnstone

► Robert McC. Johnstone, head of the Johnstone Engineering and Machine Co., Parkersburg, Penna., died on June 22 at his home in Christiana, Penna., after a long illness. He was 66 years old. Before establishing his business in 1940, Mr. Johnstone was vice-president of the Cameron Machine Co., Brooklyn, N. Y. He was a licensed engineer in New York and Pennsylvania. In 1947, Mr. and Mrs. Johnstone established a $10,000 scholarship at Lafayette College, in Easton, in memory of their son Robert, an Army private killed in action in Luzon during World War II. Awarded to a former Japanese pilot, the scholarship had been suggested by their son before he went overseas in the hope that it would result in better understanding between Japanese and Americans. Mr. Johnstone is survived by his wife, a son and a daughter.

Benjamin Wood

► Benjamin Wood, executive director of the American Rayon Institute, died on May 20 in a fall from a train passing through Edison, N. J. He was 60 years old. Mr. Wood was on his way to a business trip in Akron, Ohio. A 25 year resident of Greenwich, Conn., he had been employed by the William Esty Co. advertising concern, the Tea Bureau, and the Glass Container Manufacturing Institute before coming to the American Rayon Institute in 1953. Mr. Wood is survived by his wife, a son and daughter.

Edward T. Niles

► Edward T. Niles, president of Niles & Nelson, Inc. of New York, died on May 23 in Lawrence Hospital, Bronxville, N. Y., after a short illness. He was 64 years old. A native of Cambridge, Mass., he was employed by B. F. Goodrich Co. in 1912 and was a Navy veteran of World War I. In 1927, Mr. Niles founded Niles & Nelson, Inc., distributors of B. F. Goodrich printing rollers and of "Vulcan" press blankets. He helped to develop and popularize the rubber inking roller that made possible the high-speed newspaper presses of today. Mr. Niles was a Knight of the Holy Sepulchre of Jerusalem and was vice-chairman of the president's advisory council of the College of New Rochelle. He was active in St. Joseph's Roman Catholic Church in Bronxville and was a member of the Knights of Columbus. He is survived by his wife and four daughters.

Jesse Stiles Wainwright

► Jesse Stiles Wainwright, vice-president and member of the board of directors of the Mansfield Tire & Rubber Co., died on June 1 at New England Baptist Hospital, Boston, Mass., from complications following surgery. He was 77 years old. Mr. Wainwright was widely known over the nation through more than 35 years of activity with Mansfield Tire in various sales capacities including district sales manager and general sales manager, before becoming a vice-president and member of the board of directors. A native of Manasquan, N. J., he was engaged in the automobile business in Newark, N. J., and was head buyer for Butler Brothers in New York City before joining Mansfield Tire. He is survived by a son and three grandchildren.

Samuel R. Gates

► Samuel R. Gates, co-founder and vice-president of the old Summit Mold and Machine Co., died on June 15 in City Hospital, Akron, Ohio. He was 72 years old. Mr. Gates, vice-president of the firm at the time of its purchase in 1941 by the McNeil Machine Co., continued to work at McNeil until his retirement in 1953. He was a former officer of the Akron Rose Society and a member of the American Rose Society, Akron Lodge 82, F & AM, Yusef-Khan Grotto. Mr. Gates leaves his wife, two sons and a daughter.

Everett L. Adams

► Everett L. Adams, who had been associated with the General Cable Corp., New York, N. Y., died on March 17, at his home in Orlando, Fla. Mr. Adams, who served General Cable as assistant to the director of purchases, retired in 1949. He is survived by his wife and a son.

Gabriel George Balazs

► Gabriel George Balazs, technical superintendent at the Goodyear Tire & Rubber Co. plant in Uitenhage, South Africa, died on May 12. He would have been 55 years old on May 31. Well known throughout the Akron area, Mr. Balazs was in Akron last Fall on regular home leave. He had been with Goodyear since 1928, joining the firm as a compounder. He was transferred to the company's California plant in 1931 and in 1938, went to England as chief chemist at the Wolverhampton plant. He returned to Akron in 1945 and in 1950 was assigned to the South African facility. A native of Kenosha, Wisc., Mr. Balazs was a graduate of the University of Wisconsin and the Goodyear Fellowship Student program at Akron University. He is survived by his wife and three sons.

Guy Fleming Lipscomb

► Guy Fleming Lipscomb, Sr., president of Continental Chemical Co. and vice-president of Continental Tapes, Cayce, S. C., died on June 8 in Columbia, S. C., after an illness of several months. He was 74 years old. Well known as an outstanding educator, Dr. Lipscomb was a retired dean of chemistry at the University of South Carolina. He is listed in the encyclopedia, "Men of Science." He studied mining engineering at Auburn, graduating in 1907, received a B.S. in chemistry in 1908 and a Ph.D. at Princeton University in 1916.

Edward T. Day

► Edward T. Day, former general sales manager of the Mechanical Goods Division of the U. S. Rubber Co., New York, N. Y., died of a heart attack on June 17, while on route to Salt Lake City, Utah. He was 51 years old. Mr. Day joined U. S. Rubber in 1934 as a mechanical goods district manager for the Salt Lake City branch and six years later, took over the same duties for the larger Los Angeles branch. He was named national manager of branch sales for the Mechanical Goods Division in 1953, after a year as assistant manager. He is survived by his wife.

Walter H. Bass

► Walter H. Bass, former head of Bass & Co., crude rubber brokers in New York, and a stockbroker for 12 years with A. M. Kidder & Co., New York, N. Y., died on June 5 of heart attack at his farm in Annandale, N. J. He was 68 years old. A graduate of Princeton University, he served in naval aviation during World War I. Mr. Bass is survived by his wife and two daughters.

W. M. Mapes

► W. M. (Bill) Mapes, vice-president of the Tire Mold Division of the Bridgwater Machine Co., Athens, Ohio, died recently. Mr. Mapes, associated with the company for over 20 years, had managed sales of the tire mold manufacturing operations since 1937.

Hampshire Chemical Formed

► Formation of the Hampshire Chemical Corp. in Nashua, N. H., has been announced by Bradley Dewey, who will be chairman of the new chemical specialties manufacturing firm. Mr. Dewey founded the Dewey & Almy Chemical Co., now a division of W. R. Grace & Co., and the Bradley Container Corp., now a part of the American Can Co. Hampshire Chemical will produce chemical specialties, including synthetic amino acids, nickel and copper stripping compounds, and bottle washing compound additives. Dr. John J. Singer has been named president of the new company. He was formerly president of the United Chemical Corp. of New England. Mark Weisberg, who previously operated his own research laboratory, has been named vice-president in charge of research. Alfred A. Lawrence, vice-president in charge of sales, was formerly New England sales manager of the Dow Chemical Co.

Mr. Dewey founded Dewey & Almy in 1919 and served as its president from 1919 to 1952 and as chairman from 1952 to 1954, when it merged with W. R. Grace. He founded Bradley Container, a producer of plastic tubes and bottles in 1953 and retired as president in 1956. He later served as a consultant to the Olin Mathieson Chemical Corp. During World War II, Mr. Dewey served as deputy director and then director of the rubber program of the War Production Board. He also served as president of the American Chemical Society.

Goodyear Appoints McDonald

► John E. McDonald, formerly manager of quality control, tire and tube manufacture, has been named manager of tire service compounding for the Goodyear Tire & Rubber Co., Akron, Ohio. Mr. McDonald, a graduate of the University of Maryland, has had 28 years of experience in rubber compounding. He began his career with the Kelly-Springfield Tire Co., Cumberland, Md., where he remained for 12 years, the last four of which he spent as chief chemist. Afterwards, he joined Goodyear, serving on special assignment in the company's Compounding Division. From 1953 to 1955, he was assistant manager of industrial products compounding and has been manager of quality control, tire and tube manufacture, since 1955.

Forms Materials Handling Section

► Anderson-Nichols & Co., Boston, Mass., consulting engineers, has announced the formation of a Materials-Handling Section at its Boston offices with Leonard J. Edel as manager. Established to provide "a coordinated technical service to management", the new section will serve industry's increasing interest and need for better materials handling and reflects the rapidly expanding importance of automatic and electronically - controlled materials - handling equipment and systems.

C. Eugene Cain

Named Alco Technical Director

► Alco Oil and Chemical Corp., Philadelphia, Penna., has appointed C. Eugene Cain, who was formerly in the Planning and Engineering Group, as technical director. Mr. Cain joined Alco in 1952 as head of the Sales Service Laboratory and held this position until 1957, when he was transferred to the Planning and Engineering Group. Having extensive experience in the manufacture of synthetic rubber latex and latex foam products, Mr. Cain was previously associated with the Firestone Tire and Rubber Co., Akron, Ohio, and the Toyad Corp., Latrobe, Penna.

Providing for Safety Shields

► Goodyear Tire & Rubber Co., Akron, Ohio, has announced that it is adapting its premium tire lines to accommodate optional installation of "Captive-Air Steel-Cord Safety Shields." The group of tires includes the new "Double Eagle", placed on the market recently, the "Blue Streak" and "Nylon Custom Super Cushion", Captive-Air types. The shield is available in a full range of 14 and 15 inch sizes. O. E. Miles, vice-president, said that with this innovation the Captive-Air is no longer an individual tire, but a principle that puts the "combination of premium tire and safety shield within the reach of a wide range of motorists." Captive-Air Shields are adaptable for use in more than one set of tires.

Appoints Sales Representatives

► Dill Manufacturing Co., Cleveland, Ohio, has appointed William C. Schleifer as west coast representative and Wilbur H. Gaskill as eastern sales representative. Mr. Schleifer will cover a territory consisting of northern California, Idaho, Montana, Nevada, Oregon and Washington. Mr. Gaskill, who will have headquarters in Brownsville, Penna., will cover Delaware, southern New Jersey, eastern Pennsylvania, Virginia, Washington, D.C. and Maryland, excepting the city of Oakland.

United Engineering To Expand

► The board of directors of the United Engineering & Foundry Co., Pittsburgh, Penna., has decided to expand the Vandergrift, Penna. facility at an estimated cost of $1,750,000. The expansion will encompass extensions to both casting and steel roll finishing buildings. The casting building extension will provide space for a 57,600 cubic foot roll casting pit together with a large roll mold drying oven and space for roll molding operations. The roll finishing building extension will house two new large roll heat treating furnaces, a 60-inch and a 72-inch roll lathe, a 75-ton capacity overhead traveling crane, and a storage area for rolls in process. Company officials said that over the past few years the tendency in the metal rolling industry has been to require larger and heavier equipment. This tendency has reached a point where it is desirable to prepare for future demands of more and even larger rolls and machinery. The proposed expansion provides for additional capacity as well as facilities for the manufacture of steel rolls and machinery exceeding in size present customer requirements, the company stated.

Names District Sales Managers

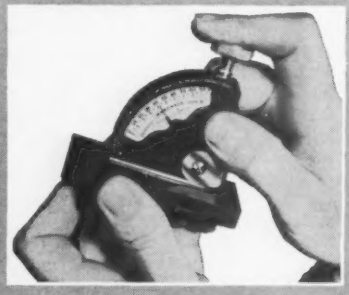
► Titanium Pigment Corp., New York, N. Y., has announced the appointment of Mark G. Magnuson as Southeastern district sales manager with headquarters in Atlanta, Ga., and W. Fraser Malcolm as New England district sales manager with headquarters in Boston, Mass. Mr. Magnuson became associated with Titanium Pigment in 1938 in the St. Louis plant laboratory. In 1945, he was transferred to the firm's Cleveland office as a sales representative and since 1955, he has been in charge of the Atlanta office. Mr. Magnuson attended Massachusetts Institute of Technology. Mr. Malcolm was employed by Eddy Paper Corp. before he joined Titanium Pigment in 1938 as a chemist at the Hudson street laboratory in New York City. He served in the United States Navy from 1942 until 1946, when he returned to the firm as a salesman in the Boston office and has been in charge of that office since 1950. Mr. Malcolm holds a B. S. degree from Alma College.

Naugatuck Paracril OZO

► Naugatuck Chemical Division of the U. S. Rubber Co., Naugatuck, Conn., has announced the development of "Paracril OZO," a new modified nitrile rubber. Supplied in the form of small flakes for easy handling, the new material is said to broaden the application range of nitrile rubber. The company states that Paracril OZO has color permanence, excellent ozone resistance, outstanding heat resistance, high abrasion resistance and excellent oil, grease and chemical resistance. Suitable for a wide range of applications such as shoe soling, wire jacketing, hose jackets, weather stripping and production of many other vulcanized rubber products, Paracril OZO costs no more than other ozone-resistant or oil resistant materials, the company states.

THE ORIGINAL...

Shore DUROMETER



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ROUND DIAL — MAXIMUM READING — for measuring cold flow or creep.

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New Goods

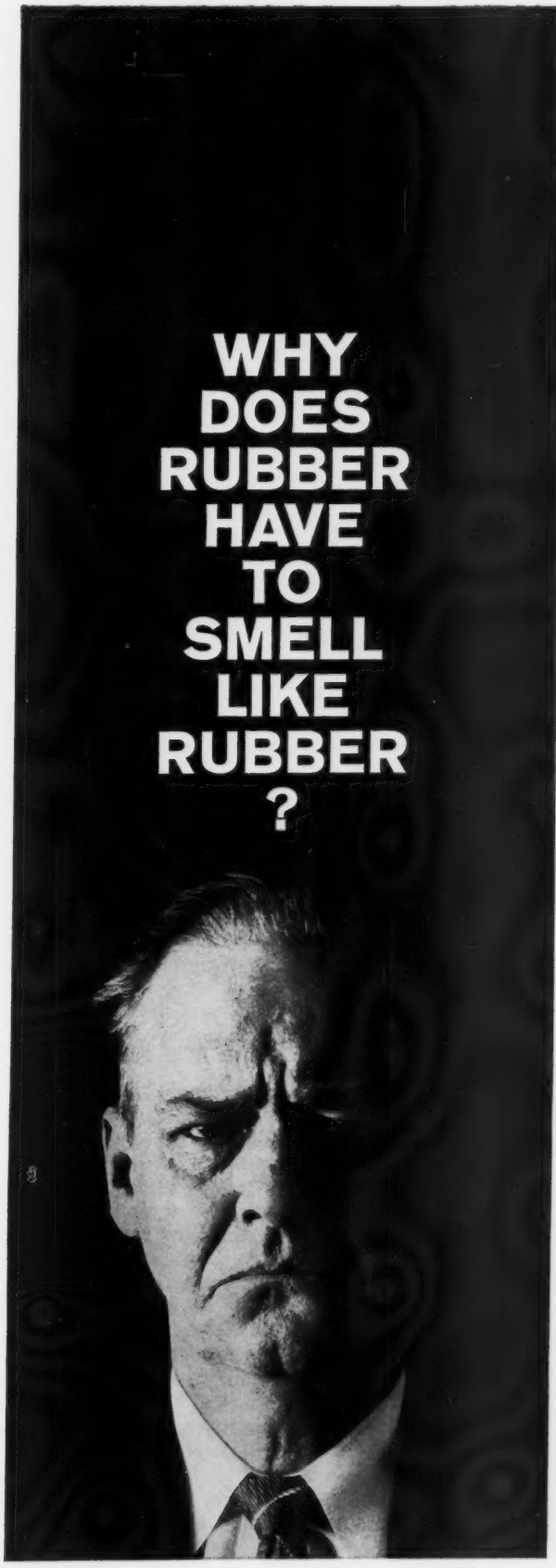
Rubbermaid All-Weather Door Mat

► Rubbermaid Inc. of Wooster, Ohio, has introduced an all-weather modern design door mat that serves as a functional spruce-up touch for the entrances of modern houses. The colorful mat features a sturdy, catch-all grid design with red and white diamond inserts spaced in a black or gray background. The Rubbermaid Door Mat's sturdy grid design facilitates shoe scraping and

protects floors and carpets from excessive dirt being tracked through the house. Rubbermaid suggests that the new door mat also be used as a dirt trap at the back door, as a resilient mat in front of basement utilities and as a dirt catcher at the bottom of the basement stairs. The Rubbermaid Door Mat is available in department, hardware and variety stores in black and gray, in 18 x 28 and 21½ x 35½-inch sizes.

Nycord Rubber Conveyor Belt

► A new line of "Nycord" rubber conveyor belts, made with cord plies and designed for general industrial use, has been announced by the B. F. Goodrich Industrial Products Co., Akron, Ohio. The company states that until now, cord construction has been available only in belts especially designed for unusual heavy duty, high tension installation. Nycord belts are said to be more flexible and have better troughing characteristics than belts made with conventional fabrics. The new construction greatly increases edge protection, fastener holding ability, impact resistance and provides extra protection against damaging effects of acid, moisture and mildew. Each cord is completely insulated and imbedded in rubber. Water or acid entering through a cover cut can not wick throughout the carcass, as in fabric belts, to cause early failure. Available in three constructions—Nycord 32, 36, and 42—Goodrich recommends the new belt for normal conveyor systems in sand and gravel operations, quarry, power plant, mine, steel industry and general manufacturing plants.



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NOTICE OF INFRINGEMENT
from Crushproof Tubing Company

Apparatus to manufacture the first extruded, spiraled, all-rubber (synthetic or otherwise) corrugated tubing ever produced in the United States or Canada was invented in 1953. On Sept. 21, 1953, and on Aug. 30, 1954, patents were applied for in the United States and Canada, respectively.

U. S. Patent No. 2,832,096 and Canadian Patent No. 556,467 on apparatus for and methods of making corrugated tubing and the like were granted on April 29, 1958.

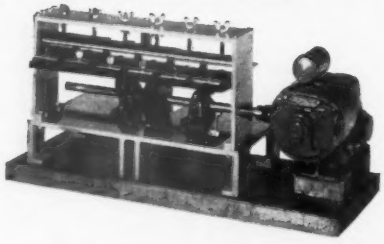
From 1954 until the present, we have positive knowledge that similar tubing has been manufactured on apparatus now covered by the above patents.

Sole licensees under these patents are the Crushproof Tubing Company and Cyclovac, Inc., of Cleveland and McComb, Ohio. This is to serve notice that immediate legal action will be taken against any and all infringing manufacturers.

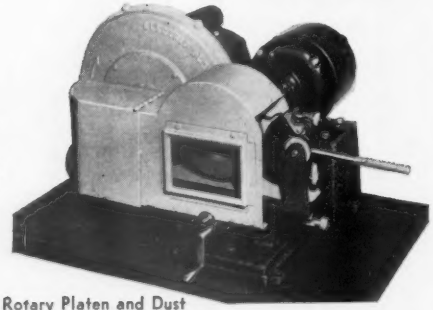
Products manufactured and sold by Crushproof Tubing Company and Cyclovac, Inc., include garage exhaust tubing, commercial vacuum cleaner hose, farm implement tubing, oxygen hose, other types of medical tubes and skin-diving tubes.

LABORATORY APPARATUS for the RUBBER INDUSTRY

ROSS RUBBER FLEXING MACHINE
(for ASTM D1052)



RUBBER SAMPLE BUFFING MACHINE

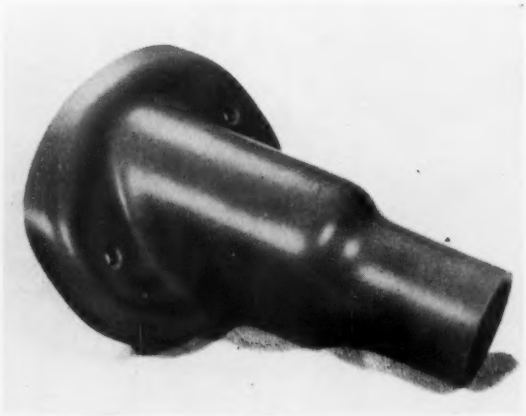


(Shown with Rotary Platen and Dust Collector with Suction Blower.)

EMERSON APPARATUS CO.
183 Tremont St., Melrose, Mass.

Min-O-Sol Fertilizer Spouts

► Plastic and Latex Division of Minnesota Rubber Co., Minneapolis, Minn., in cooperation with the West Fargo Manufacturing Co., has developed what is said to be a revolutionary new fertilizer spout for fertilizer attachments on grain drills. Replacing the cast aluminum spouts formerly used, these spouts have the same dimensions as those made of aluminum. The new spouts are made of



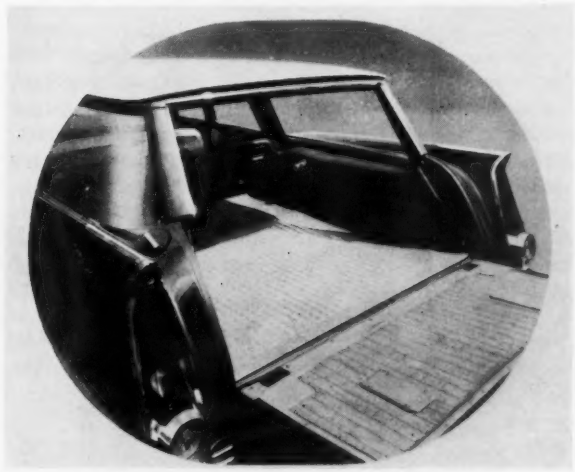
a rigid polyvinyl chloride plastic material called "Rigid Min-O-Sol," which can be machined, tooled or tapped, has high strength and rigidity, an exceptionally high impact rating plus corrosion resistance. Rigid Min-O-Sol is a thermal setting material that can be molded to extremely close tolerances. The company states that because of its rigidity and strength, its extremely high resistance to corrosion and weathering, and the elimination of the need for paint or other protective coating, this material is being developed to replace metal and castings for many other uses.

Vinyl Covered Fiberglas Screen

► Textile Products Division of the Owens-Corning Fiberglas Corp., New York, N. Y., has introduced a new type of screening made of glass fibers impregnated and coated with a Geon vinyl material which is said to be rustproof, exceptionally strong, resilient, flexible and extremely lightweight. Glass fiber yarns, made up of 408 glass filaments, are covered with "Chem-o-sol" after weaving. The vinyl is softened under heat and when it cools, all intersections of the weave are virtually welded together, strengthening the mesh and eliminating ravelled edges, the company states. The soft Geon finish is said to eliminate glare and to provide better see-through visibility. Color can be built right in since the coatings can be made in a wide range of hues. The easily-installed screening is said to be particularly well adapted for patio enclosures since it doesn't wrinkle or become dented from accidental bumps. According to the company, the material is excellent in atmospheres of salt air, smoke or fumes, where ordinary screening would tarnish and corrode.

Ace Rubber Car Mats

► Ace Rubber Products, Inc., Akron, Ohio, has introduced a complete line of distinctive automobile floor mats which are said to offer excellent wearing and aging properties with a minimum of discoloration. Made in sizes to fit all cars, the mats may be obtained in matching sets of three or four, individual or twin sets for front or rear use and single center-contour protectors. They were molded from Plioflex synthetic rubber, which was selected for this application because of its uniform processability, full color possibilities and excellent curing qualities, the company states. It is further reported that Plioflex furnishes the required flexibility and tear, abrasion and water resistance. Designed for car interiors, station wagons and trucks, the mats are available in a wide range of colors, including red, blue, green, gray, turquoise and cordovan, from automotive equipment distributors, chain stores and catalog houses.



Campco-Base Dishwashers

► New portable, automatic dishwashers that are constructed with a heavy duty base of Campco "S-540" rubber modified styrene sheet, are being marketed by Chico General Products Corp. of San Francisco, Calif. The vacuum formed fabricated base is light in weight, possesses low moisture absorption, is tough, impact resistant and nontoxic, according to company officials. Designed to fit easily onto sink countertops, the portable unit uses no electricity. A compound rotary washer spinner is activated by hot water entering the unit through a specially designed hot water faucet attachment which also feeds the detergent. The dishwasher automatically washes and rinses dishes for a family of five—including up to 36 plates, cups, saucers, glasses, small bowls, platters, plus 35 pieces of silverware. The dishes air dry quickly and hygienically after a wash and rinse cycle of approximately six minutes. Campco is produced by the Chicago Molded Products Corp.

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You can depend on MAGLITE D to provide instantaneous acid acceptance in Neoprene formulations. This not only means superior scorch protection, but also results in:

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Shockmaster Conveyor Belt

► A unique type of conveyor belt, especially designed to absorb and distribute shock, has been introduced by the Quaker Rubber Division of the H. K. Porter Co., Philadelphia, Penna. Named "Shockmaster," the belt can be turned over and used again after the first carrying side is worn. It is a medium weight, double duty belt extremely flexible with a high impact resistance for use over smaller than usual pulleys on short center hauls. Once the carrying surface of a conventional conveyor belt was worn out, the belt had to be replaced. Quaker engineers expect the new belt to be extremely economical, now that both top and bottom carrying surfaces can be utilized.

Shockmaster is made of two or three ply heavy cotton-nylon fabric with a skim coat of rubber between plies. An envelope of frictioned, double skimmed, extra heavy open weave all nylon fabric, entirely encompasses the core and acts as a cushion. The top and bottom covers are made of a high quality abrasion resistant rubber, 3/32-inch thick. The heavy cotton-nylon core construction with an extra heavy open weave nylon envelope make this belt unusually flexible without loss of bulk or strength. Company officials said the extra flexibility of Shockmaster is advantageous in handling light weight, bulk materials, and in applications where 45° idlers are necessary on narrow belting.

Surety Industrial Glove

► Fabricated from Dupont "Teflon", a new industrial glove has been developed by the Surety Rubber Co. of Carrollton, Ohio, that is said to be completely impervious to strong acids and solvents. Tested under the severest conditions, the gloves are unaffected by attacks of fuming red and white nitric acids, 100 per cent sulfuric acids and all strong solvents, the company states. The gloves are available in 12 and 16 inch styles that feature the Surety "Turn Cuff" for maximum protection.

PRODUCT NEWS

Pepton 22® Plasticizer—Safety First in Handling

► In Cyanamid's Pepton 22 Plasticizer the rubber industry has found, over a period of ten years' usage, a chemical which is essentially non-dermatitic even during the hot sticky summer months when skin pores are more receptive to irritation. Incorporating Pepton 22 in the mastication operation not only provides a softer, smoother, more plastic mix, with less power consumption, but also assures workers of a higher degree of safety when handling the powder.

Latex Impregnated Non-woven Fabrics

► The growing use of non-woven fabrics, especially in wearing apparel, has accentuated the demand for suitable bonding agents. Rubber latex, both natural and synthetic, has proved satisfactory for this purpose. A non-staining antioxidant must be incorporated, however,

to counteract the degrading effect of oxidation and to maintain good flex and other physical properties. Cyanamid's Antioxidant 425® not only provides outstanding protection against oxidation, but is unequaled by any other antioxidant for its non-discoloring properties. Antioxidant 425 has no adverse effect on the cure time of the latex film.

NOBS Special for Tire Stock Processing Safety

► Automobile tire stocks now use SBR as the essential basic rubber hydrocarbon. Although the very maximum in processing safety is not always required with this polymer, faster production schedules and higher processing temperatures demand a certain safety margin. Cyanamid's NOBS* Special accelerator, together with its even more active brother DIBS®, assures the tire industry of sufficient processing safety in tire production, regardless of the hydrocarbon or type of carbon black used.

*Trademark

Additional information on these rubber chemicals, and how they may best serve you in your specific applications, may be obtained from the American Cyanamid Company, Rubber Chemicals Department, Bound Brook, New Jersey.

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... the most effective non-staining non-discoloring antioxidant commercially available! Protection against oxidation is unsurpassed, and even in the whitest rubbers only the slightest degree of discoloration is produced on prolonged exposure to sunlight. In natural rubber, butadiene-styrene copolymers and neoprene, Antioxidant 2246 offers the best *combined* protection against aging and discoloration. You can't buy better.

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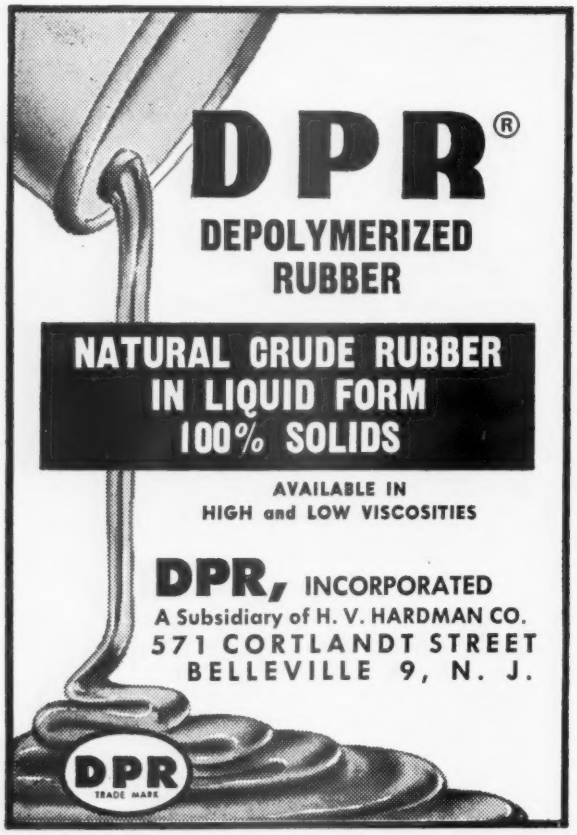
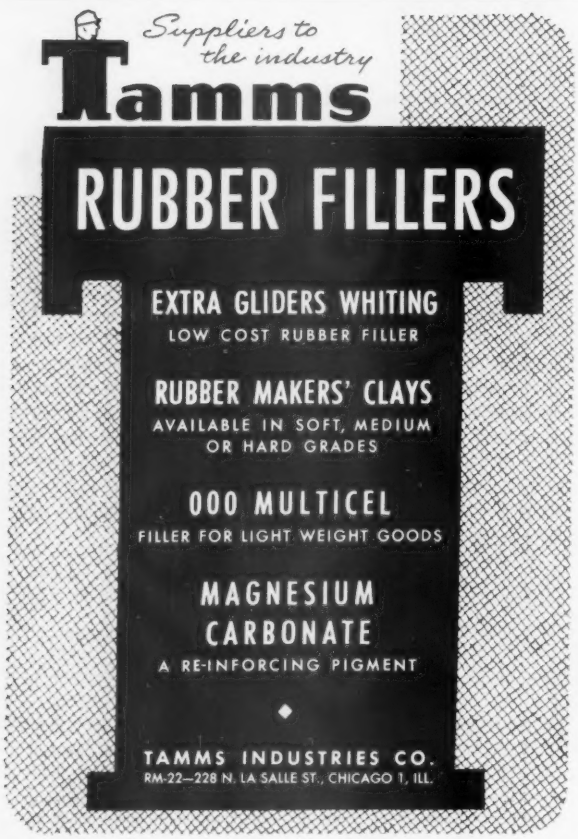
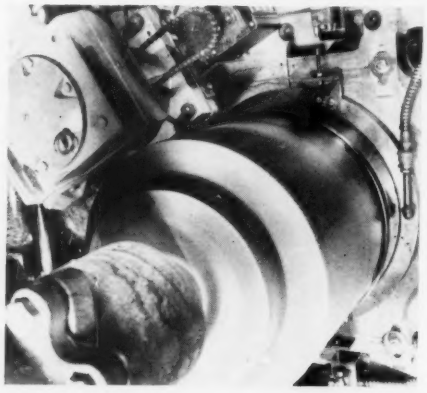




New Equipment

Farrel Crown Compensator

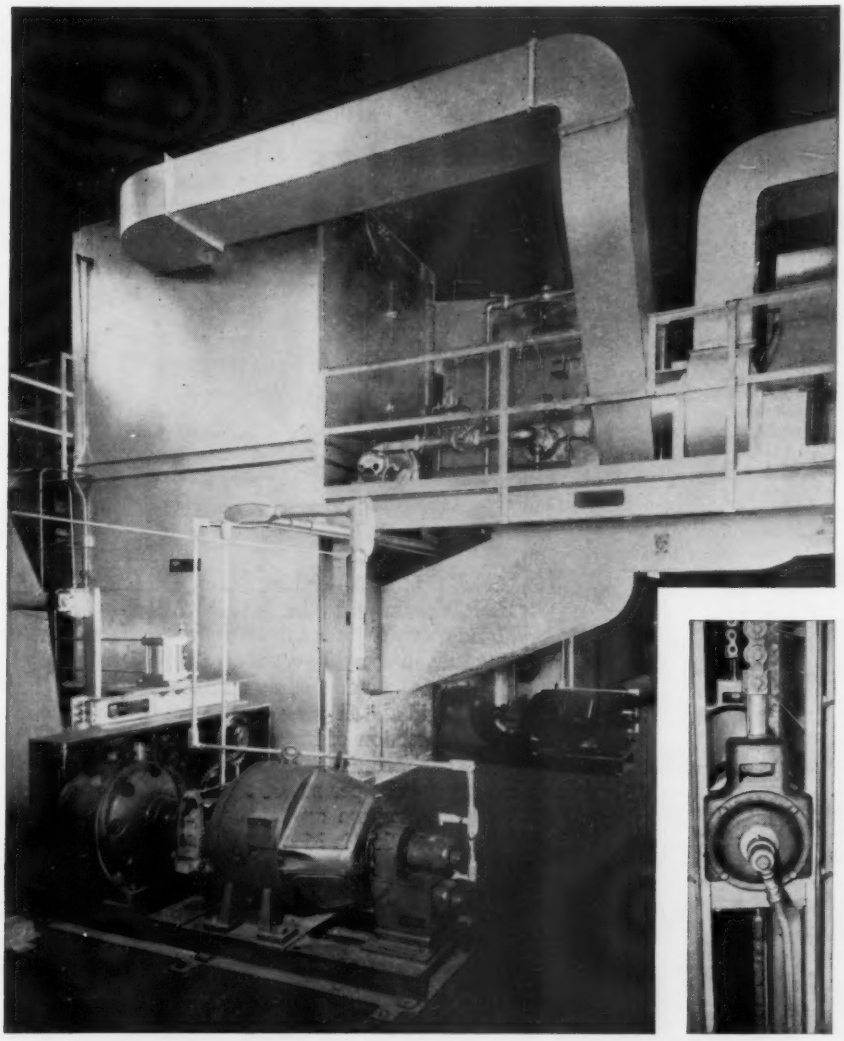
► The new Farrel Crown Compensator for increasing the range of gauges of existing calenders has been developed by Farrel-Birmingham Co., Inc., Ansonia, Conn. The instrument applies the crossed-axes principle of roll-crown control to existing calenders which have connecting gears mounted on the rolls. In general, this mechanism can be built into any three- or four-roll calender in



which the rolls can be removed through the frame openings. Gauge accuracy and improved lay-flatness of plastic film and sheet are said to be obtained over a greater range of gauges. With rubber sheet and coatings, improved uniformity of gauge is said to effect substantial economy in the amount of stock used. Adjustments can be made by push-button control to compensate for differences in separating force caused by changes of gauge and variations in stock composition, operating temperature and speed. The maximum amount of crown change possible is approximately .012-inch for a calender with 24-inch diameter rolls, and proportionately less for larger machines. The device consists of complete new bearings for the roll to be crossed, a new swivel-connecting gear for this roll, and a small gear motor for varying the amount of crossing. The main outer bearing housing fits into the frame in the customary manner with the usual side clearance. The existing screw mechanism is used for roll adjustment.

Raydyne Dynamic Balancer

► A new machine for the dynamic balancing of rotors, claimed to be the fastest, safest and most accurate ever developed for the purpose, has been announced by Raydyne Corp., Springfield, Illinois. Called the Raydyne Automic System, the machine uses a seismic-mounted electronically-controlled unbalance indicator with a force absorption device which automatically is said to stop all motion caused by unbalance and afford accurate balance testing with the first run of the rotor. By eliminating test weights, time consuming trial runs and the need for a highly skilled operator, the company claims the machine can effect great savings.



Within the first day of startup, full width nylon tire cord processed in this 30-yard-per-minute, 14,000-pound-tension **IOI** Rollevator® Oven*, was made into aircraft tires meeting all qualification tests.

The Rollevator® roll automatically moves up and down within the oven, in direct relation to line speeds. Thus, at *any line speed, heat-exposure* time of the nylon is held *constant* at a constant temperature setting and at constant tension.

Rollevator® Oven* hot stretches nylon tire cord at constant optimum temperature, constant time and constant tension, at variable line speeds

The IOI Rollevator® Oven* is the answer to more uniform hot stretching of nylon with greater production efficiency. Simple and automatic in operation, it practically eliminates costly shutdown and repair time. When the line is stopped the Rollevator® roll automatically lowers out of the heat zone, eliminating the need for quick cool purging of the oven and the time and expense involved in reheating the oven when starting up again. Its low operating cost combined with low initial cost assures you of lower production cost. An IOI sales engineer will be glad to give you complete information about the Rollevator® Oven* and to discuss your requirements for any system from 3 to 100 yards per minute.

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IOI ENGINEERING VERSATILITY

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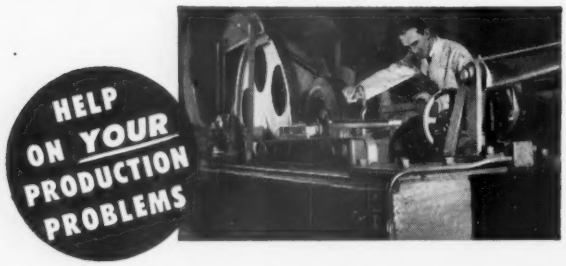

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Whatever your problems...processing rayon or nylon cord, fabrics, carbon blacks, etc. . . . I.T.A.'s expert staff of technicians and teachers can help you.

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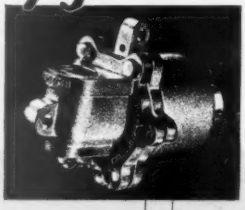
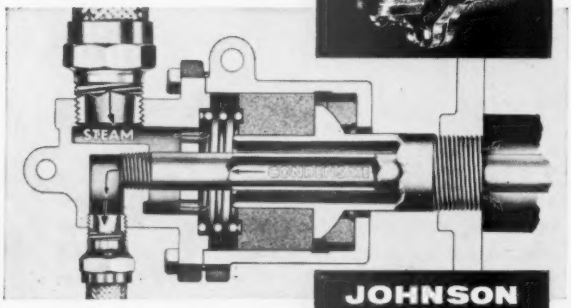
Need a rotary joint?

. . . for water-cooled or steam-heated rolls . . .





JOHNSON Rotary Pressure JOINTS

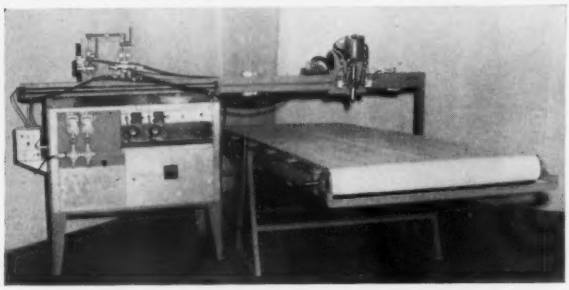
Type SB illustrated is completely self-supporting. For fully engineering data write for Bulletin S-3002.

Johnson started the whole idea . . . is far ahead in know-how, available types and sizes. Johnson Joints are completely packless, need no lubrication or adjustment. Used on dryer rolls, mills, waxers, calenders, slashers, printing presses, etc.—handling steam, water, hot heat transfer oils, Dowtherm, Mansanto Aroclors, etc. Actually serving under pressures as high as 2400 psi. Sizes up to 8".

THE JOHNSON CORPORATION
868 Wood St., Three Rivers, Michigan

Klauder Williams Polyurethane Foam Machine

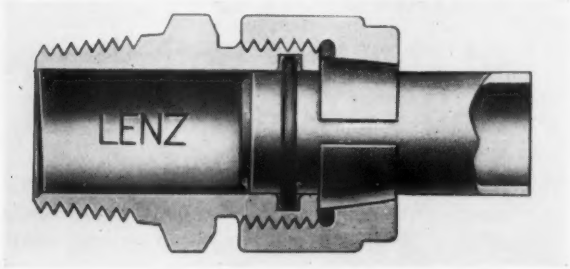
► Klauder Williams polyurethane foam machines are said to successfully blend or foam all formulations manufactured to date by a system of continuous proportionate metering and mixing. Manufactured by Klauder Weldon



Giles Co., Philadelphia, Penna., and sold through Gabriel Williams Co., Inc., 77 Mill Road, Freeport, Long Island, N. Y., the machines are said to offer the following advantages: easy operation; production of a full range of foam depending on formulations in all densities, both rigid and flexible; simple adjustability; compactness, and protection of all working parts by use of corrosion resistant materials. Standard machines produce from 8 to 15 pounds per minute, depending on the formulation. Larger sizes are available on special order. Shown in the illustration is Model 800 with reciprocating traverse mixing head and power driven mold conveyor.

Lenz O-Ring Tube Fitting

► The Lenz O-ring tube fitting, manufactured by Lenz Co., Box 1044, Dayton 1, Ohio, is used on vacuum, air, and hydraulic systems. The fitting seals by means of a standard stock O-ring. A split tapered sleeve holds the



tubing in place when the clamping nut is drawn up. Excessive wrench torque is unnecessary because the seal does not depend on the tightness of the nut. The nut fits loosely on tubing for ease of assembly. The higher the pressure the greater the grip of the tubing, and the greater the seal of the O-ring. No exact tube length is necessary. There is no metal-to-metal seal, so no concentration of stresses due to flares or ferrules for tube failures, making it a superior fitting under shock and vibration. The fittings are available in a full range of shapes—connectors, unions, elbows, tees, crosses and bulkhead connections—in O.D. tube sizes from ⅛ to 2 inches.

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RUBBER STRIP-CUTTER

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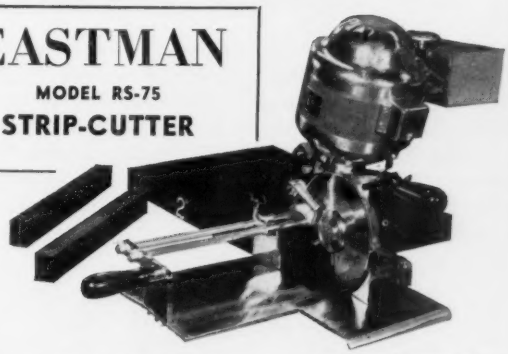
MODEL RS-75
STRIP-CUTTER



- cuts strips 1/8" to 10" wide from slabs up to 2 inches thick and up to 95 durometer hardness.

Guide may be removed to use the machine for cutting larger sections from slabs.

This newly developed strip-cutter, powered by a compact one-horsepower motor, makes it simple and easy to cut perfectly square strips within .010". Blade edge and gauge are continually moistened for easy cutting. Knife is automatically sharpened while cutting. Many other fine features. Care to try this Eastman?

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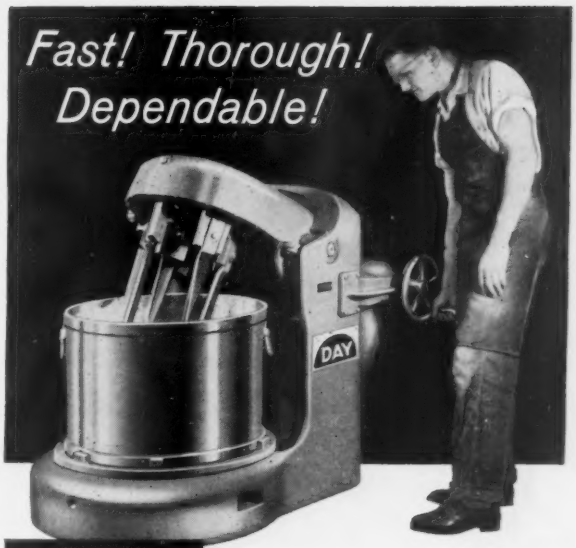

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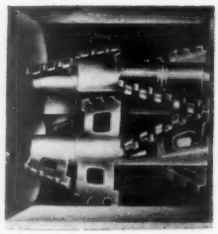

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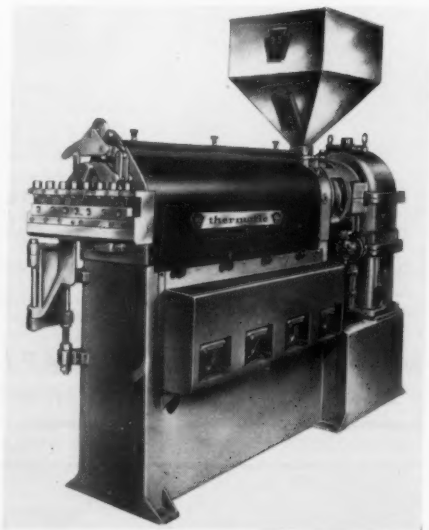
NEW EQUIPMENT (CONT'D)

Davis-Standard Thermoplastic Extruders

► A completely new thermoplastic extruder series designed to meet the higher production requirements of the plastics and wire industries has been introduced by Davis-Standard Division, Franklin Research Corp., 12 Water St., Mystic, Conn. Specifically engineered to deliver higher production in each bore size, the new D-S Thermatic Series is available in 2½, 3½, 4½, 6 and 8-inch models.



The Thermatic Series is completely new from head end to drive end. New helical, and in larger models, herringbone gearing plus greatly increased thrust bearing capacities enables each model to handle a large increase in horsepower over the corresponding previous model. Increased production through higher stock screw speeds are said to be possible through this greatly increased power rating. Lubrication for the gear set is sprayed onto bearing and mating surfaces by a force-feed system, claimed to ensure complete lubrication even at extremely low operating speeds. A visual oil level gauge provides a fast, constant indication of the oil supply.

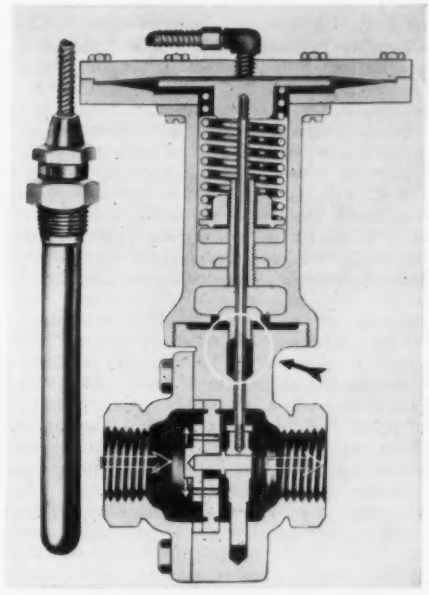
A new 4-keyway drive end on the Thermatic Series stock screws is said to eliminate eccentric tendencies at high rpm and increase load-bearing capacity of the screw. The entire drive end of the stock screw is tapered so that it can be easily disengaged from the drive gear and removed from the extruder. A unique arrangement of the feed section bearing and seal permits fast removal of the bearing for cleaning and inspection without removing the stock screw or dismantling other components. Labyrinth oil seals throughout the extruder are designed to eliminate costly replacements and shutdowns for oil seal maintenance.

The Thermatic Series employs an improved version of the D-S Therma-Fin temperature control system. New, larger fins and heating elements in addition to new blower and damper arrangements are said to provide precise

temperature control for a complete range of thermoplastics even at maximum screw speeds. A one-piece cylinder with Xalloy liner is utilized in the new series. In addition, an improved head clamp and hinge permits opening of the head with loosening of only one bolt. In the open position, the head clamp is completely clear of the head flange. The hinged head support swings completely clear of the front of the extruder and simplifies head alignment and change-over.

Jordan Temperature Control Valve

► The OPW-Jordan temperature control valve, distributed by Jordan Industrial Sales Division, OPW Corporation, 6013 Wiehe Road, Cincinnati 13, Ohio, now



incorporates Teflon-impregnated asbestos stem packing. This packing is said to be inert, durable, trouble-free, and not to shrink, swell, or deteriorate, and to be self-lubricating. Its use results in an easier valve stem movement which allows diaphragm power to be transmitted more accurately to the sliding gate seat. The valves are available in ¼- through 2-inch sizes with 125 WSP cast iron and 250 WSP bronze bodies.

► A **punch press double-stop control** to prevent shutdown time on high-speed automatic and semi-automatic presses and to protect against damage to presses and dies has been developed by Tipptronic, Inc., Chagrin Falls, Ohio. Press speeds as high as 450 strokes a minute can be handled by the control.

► The Gardner **direct reading color difference scope,** an instrument designed to take the guesswork out of color matching, is manufactured by Gardner Laboratory, Inc., P. O. Box 5728, Bethesda 14, Md. The instrument is capable of semi-automatic standardization which is said to insure repeatability of results.

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The Atlas Fade-Ometer has world-wide acceptance as the standard machine for testing the action of sunlight on materials.

A wide range of industrial products are tested daily in Atlas Fade-Ometers to determine the deterioration of materials due to the action of sunlight.

From 21 to 126 samples, depending on size, can be simultaneously exposed to the light of the Atlas Enclosed Carbon Arc. Temperature is controlled automatically and humidity is furnished by evaporation from a constant water reservoir. Operation of the Fade-Ometer is completely automatic, permitting the machine to be left in continuous 24-hour operation.

The Carbon Arc Lamp in the Fade-Ometer produces radiation at the sample similar to sunlight, both as to intensity and spectral distribution.

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Reviews

BOOKS

British Compounding Ingredients for Rubber. Compiled by B. J. Wilson. Published by W. Heffer & Sons, Ltd., Cambridge, England (for the Research Association of British Rubber Manufacturers). 6 x 9 in. 528 pp. £3 net (approximately $8.40).

Approximately 1600 proprietary British and Commonwealth rubber chemicals and compounding ingredients, representing the products of some 330 companies, are included in this compilation. Following the style of the American "Compounding Ingredients for Rubber," data are furnished on the function, physical properties, analysis and usage of each product listed. The RABRM Class is also shown in each instance.

The book is divided into three main subjects: (1) Compounding Ingredients for Natural and Synthetic Rubbers; (2) Compounding Ingredients and Processing and Modifying Agents Specifically for Natural and Synthetic Latices; (3) Special-Purpose Products. The first section covers such materials as accelerators, antioxidants, blowing agents, fillers and reinforcing agents, peptizers, softeners and vulcanization agents. The second, as indicated by its title, covers similar materials intended for use with the latices. The third section covers dusting and anti-tack agents, mold lubricants, reclaimed rubbers, reclaiming agents, solvents, specific ingredients for rubber solutions, and synthetic rubbers and latices. In addition, there is included an index of manufacturers and suppliers and a subject and trade name index.

There has long been need for a compilation of this type. The first step in this direction was taken by *Rubber World* (then known as *India Rubber World*) in 1936 with the publication of its "Compounding Ingredients for Rubber." This was followed in 1947 by a second and larger edition which, unfortunately, is now out of print. A third edition is planned but no publication date has been set. Both of these editions, however, were restricted to American proprietary materials.

More recently, the Elsevier Publishing Co. brought out "Rubber Chemicals," by J. Van Alphen. Despite its title, this book was also a compilation of rubber materials, and its prime purpose was to give the chemical name of any material, wherever possible, together with its trade names in various countries and the names of the suppliers. The basic reason for this compilation, accomplished under the auspices of the Rubber-Stichting of Delft, Holland, was due to the fact that one and the same material is often denoted by different trade names in current use both in technical and scientific rubber literature. One major failing of this compilation is the fact that it was restricted to only seven groups of chemicals.

Despite any possible shortcomings, compilations of rubber chemicals and compounding ingredients of any kind, restricted or not, are welcome additions to the rubber chemist's bookshelf. No individual can possibly remember the chemical compositions and physical characteristics of all the compounding materials in which he is interested. Therefore, this latest book covering British and Commonwealth proprietary materials will serve an extremely useful purpose and the Research Association of British Rubber Manufacturers is to be heartily commended for its effort. It should also be noted that the physical arrangement of the various listings is excellent and the type, paper and binding are well selected.

Gaps in your library? Contact Book Dept., Rubber Age, 101 West 31st St., New York 1, N. Y.

Ball, Tube and Rod Mills. By H. E. Rose and R. M. E. Sullivan. Published by Chemical Publishing Co., Inc., 212 Fifth Avenue, New York, N. Y. 5¼ x 8 in. 258 pp. $6.00.

This volume, devoted to the internal mechanics of ball, tube and rod mills, represents an effort on the part of the authors to fill a need for a comprehensive analysis of their subject. They point out, for example, that although many investigations have been carried out to show the influence of the various parameters defining the characteristics of the mill and the charge, as far as is known there had previously been offered no formula for the calculation of the instantaneous rate of production of specific surface from the knowledge of these parameters. Such a formula is provisionally offered in this book.

Only phenomena occurring in, or originating within, the shell of the mill have been treated, except for logical deviations. The breakdown of gearing has been considered in conjunction with surging, for example, since the authors believe that gear failures often arise from vibrations which are initiated by the oscillation of the mill charge within the shell. Similarly, the power required to drive a mill has been studied in detail, since the power demand is clearly related to the configuration of the charge within the mill and so is a matter of internal dynamics. A short review of the present state of knowledge of comminution of solid bodies is given, and a chapter reviews the subject of milling additives—also on the ground that these subjects are essential in a book which deals with the internal operations of the tumbling mill.

A listing of the chapter titles gives an idea of the scope of the material covered: (1) Introduction; (2) The Motion of the Mill Charge; (3) The Power to Drive a Mill; (4) On the Comminution of Solid Bodies; (5) The Process of Grinding within a Mill; (6) Other Considerations Relating to the Characteristics of a Mill; (7) Surging and Vibration in a Mill; (8) Metal Wear in Mills; (9) The Role of Additives in Milling. An appendix of tables of mill filling parameters and subject and author indexes close the book.

The book is clearly written and lavishly illustrated with photographs, graphs and diagrams. The authors treat their subject with depth, and what they have to say will be of interest to the mill designer, operator, chemical engineer and general reader with an interest in this phase of mechanics and engineering.

•

Prüfungsbuch für Kautschuk und Kunstoffe. (Testing Manual for Rubber and Plastics). By Karl Frank. Published by Berliner Union, Stuttgart, Germany, 1955. 6 x 9 in. 140 pp. DM 18 (in German).

The introduction to this little book states its purpose as an attempt to present in concise form the physical testing procedures for rubber and plastics, including new methods, as yet little known, used in Germany and in foreign countries, and thus to demonstrate all the different approaches to material testing used internationally. The introduction closes with the statement that the author hopes to provide the chemist or engineer working in the field of rubber and plastics with a general view of the testing methods in use today and to guide him in using the proper apparatus for testing purposes. The latter purpose appears to be the main one. The pictures of apparatus shown are good photography. Practically all of the apparatus show the trade mark 'FRANK' which in connection with the advertisement on page 137 for Karl Frank Company reveals that the book is essentially a catalogue of testing machines supplied by the author's company. Listing of procedures is rather incomplete and somewhat out of date; the latest ASTM methods cited date from 1949. The only aim stated in the introduction which seems to have been achieved is brevity. Ten of the 140 pages of the book are devoted to introductory material, 6 pages are lists of ASTM and DIN designations, 5 pages are literature references, 2 pages are an index and 24 pages are advertising, which leaves, subtracting blank pages, only about 90 pages for text and illustrations. It is obvious that the ambitious aims of the author could not be accomplished in so little space. The book contains useful graphs comparing Defo hardness with other plasticity measurements, including Williams and Mooney. F. R.

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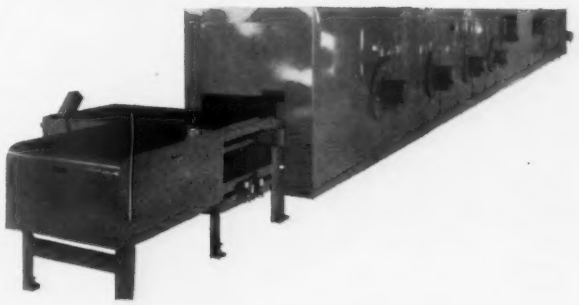

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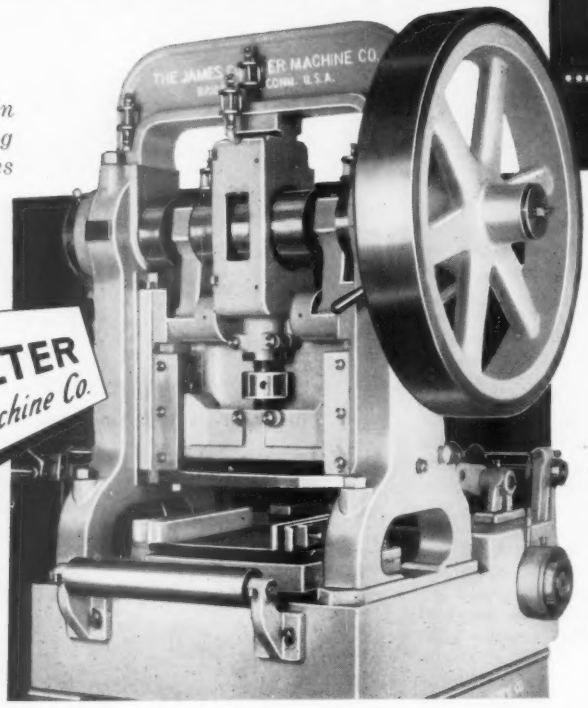

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BOOKLETS, CATALOGS, etc.

Banbury Mixers. (Bulletin No. 207). Farrel-Birmingham Co., Inc., Ansonia, Conn. 8½ x 11 in. 36 pp.

This booklet furnishes up-to-date information about Banbury mixers and their manufacture. Different sections discuss history; applications (rubber processing; high-horsepower mixing; rubber grinding and reclaiming; dewatering; and uses in manufacturing linoleum, plastics and asphalt products); features of design and construction; sizes and capacities; installation and operation; process engineering; the company process laboratory, and the Banbury rebuilding and repair service. The functions of the machines in the rubber, linoleum, plastics and asphalt industries are described in detail. Design and construction of the Banbury are explained fully, the text being supplemented by a generous number of schematic diagrams and photographs. Two pages are given to other Farrel-Birmingham processing units (calenders, pelletizers, extruders, mills, molding machines and presses), and one page is used to list all the machines produced by the company other than the Banbury. A handsome and informative publication for the rubber compounder.

•

Structural Sealing with Elastomeric Type Sealants Based on Thiokol Liquid Polymers. Thiokol Chemical Corp., Trenton 7, N. J. 8½ x 11 in. 12 pp.

Elastomeric sealants for all types of building applications are presented in this brochure, which features in particular case histories on curtain wall installations where the sealants have been used as superbonding mediums for building materials in use today. Proper handling, mixing, color availability and methods of application are demonstrated. Also shown are varied applications, in both old and new structures, as used with sealing copings, expansion joints, tile and masonry. Data on various tests, including adhesion and stress, sag, low temperature, weather resistance and peel strength, are given.

Machinery for Processing Rubber and Plastics. (Catalog 58-L). Stewart Bolling & Co., Inc., 3190 East 65th St., Cleveland 27, Ohio. 8½ x 11 in. 24 pp.

This catalog describes and illustrates Stewart Bolling laboratory and production equipment, with most of the emphasis on the experimental machinery. Nine pages are devoted to roll mills of different dimensions and designs, with the operating features and applications of each indicated. Also shown are refiners; 2-, 3- and 4-roll calenders; 4-rod type and slabside presses; vulcanizers; and intensive mixers, all with a full description of dimensions, capacities and applications. Although most of the illustrated machines were designed for the laboratory, many are also suitable for small-size production use. Tables provide engineering data on the capacities of sizes other than those shown. Three closing pages are devoted to heavy equipment—intensive mixers, calenders, mills and presses. This publication offers a comprehensive survey of laboratory equipment of interest to the rubber technologist.

•

OPW Loading Assemblies—Bulk Plant Loading and Unloading Equipment. (Catalog F-32). Jordan Corp., 6013 Wiehe Road, Cincinnati 13, Ohio. 8½ x 11 in. 24 pp.

A concise but complete presentation of various items of OPW bulk plant loading and unloading equipment is given in this brochure. The publication is divided into sections on spring-balanced assemblies, counter-balanced assemblies, balanced pressure loading valves, tank car loading and unloading assemblies, swing joints and engineering data. Each assembly is schematically diagrammed with pertinent engineering data indicated; component parts are listed individually with detailed information. Diagrams and drawings are used also to depict various individual items, such as valves, swing joints and loading nozzles. A thorough analysis of the equipment and its uses is provided.

Butadiene: Four-Carbon Building Block. Texas-U.S. Chemical Co., 260 Madison Ave., New York 16, N. Y. 8½ x 11 in. 52 pp.

This technical manual, written for research chemists and others working on new products and processes, has been produced to encourage new chemical applications for butadiene. It contains specifications and information on physical and chemical properties; analyzes 150 chemical reactions; offers extensive information on fields of end uses, and presents a chemical index of reactants and reaction products, as well as data on samples for experimentation. The bibliography contains more than 300 references. The booklet, handsomely designed and printed, ably fulfills its purpose of demonstrating the versatility of butadiene as a basic raw material. Hints on storage and handling and other information which will be of interest to anyone working with this material are included. An important publication for the synthetic rubber industry.

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Dynamic Properties of Enjay Butyl and Their Applications. By R. L. Zapp. (Bulletin No. 6). Enjay Co., Inc., 15 West 51st St., New York 19, N. Y. 8⅜ x 11 in. 16 pp.

Among natural and synthetic elastomers, butyl rubber possesses unique dynamic properties. This bulletin explores in detail these properties. It begins with an examination of the fundamental properties of butyl rubber in dynamic service, in which the physics of how the elastomer behaves are described, and then proceeds to vulcanization for dynamic applications, adhesion to metal, properties of butyl rubber compounds and implications for use in butyl rubber tires. An effective use of graphs and charts in portraying the technical data aids in the presentation.

Organic Chlorine Compounds. Union Carbide Chemicals Co., 30 East 42nd St., New York 17, N. Y. 8½ x 11 in. 46 pp.

Eleven organic chlorine compounds are described in this booklet, which details physical and physiological properties, use information, shipping regulations, handling and storage, and specifications and test methods. The materials discussed are ethylene dichloride, Chlorasol fumigant and solvent, propylene dichloride, trichlorethane, butyl chloride, 2-ethylhexyl chloride, dichlorethyl ether, dichlorisopropyl ether, triglycol dichloride, ethylene chlorhydrin and epichlorhydrin. A general discussion of the advantages of chlorinated solvents and of handling and storage procedures for chlorinated compounds is given. Data are grouped in tables for rapid reference. An extensive list of literature references is divided into sections by end uses of the materials. Included are references to liquid polymers and to the polymerization of styrene.

•

A Graphic Method for Selecting Oils Used in Compounding and Extending Butadiene-Styrene Rubbers. Industrial Products Department, Sun Oil Co., 1608 Walnut St., Philadelphia 3, Penna. 11 x 8½ in. 26 pp.

How to select an oil for compounding and extending styrene rubbers is the subject of this booklet. A classification system devised by Sun provides the rubber compounder with a quick method for selecting a process oil. The booklet includes many charts for predetermining the effect of an oil on non-staining characteristics, polymer degradation, volatility and low temperature properties of an oil-extended polymer. Also included is a list of the company's rubber process oils and their performance in a polymer as based on the classification system.

ROYLE

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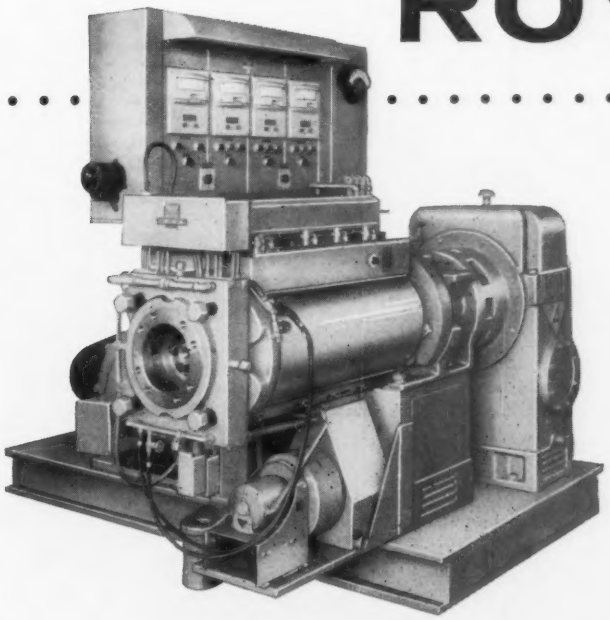
EXTRUDERS



These all electric extruders with radiant heat and high velocity evaporative cooling are designed to process either plastic or rubber compounds. The result of more than three quarters of a century of experience — Royle pioneered the extrusion process in 1880— in the design and construction of extruding machines time tested features have been built into Spirod to assure dependability.

Write for Bulletin #463

JOHN ROYLE & SONS

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London, England — James Day (Machinery) Ltd. — Hyde Park 2430-0456

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Downey, Cal. — H. M. Royal, Inc. — TOpaz 1-0371

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MARKET REPORTS

TRENDS
NEWS
PRICES

Natural Rubber

Since our last report (June 2), the price of spot rubber on the New York Commodity Exchange has moved in a range of 125 points, high for the period being 26.88c reached on June 25 and 26, and low being 25.63c reached on June 9. The average price of spot rubber for the month of June was 26.20c based on 21 trading days. This compares with an average of 25.51c in the previous month.

The trade reports that while there was little outstanding in the general run of news surrounding the rubber market, there was a noticeably softer tendency. This was partly attributed to the failure of the New York market to respond more impressively to the action in Singapore. In addition, consumers abroad are showing no particular interest in making commitments.

Rubber Situation Abroad

There is a growing feeling in London as well as the Continent that the spread between No. 1 R.S.S. and FAQ's is much too wide and that there will be a gradual and progressive narrowing of the wide differences, particularly if Russia and China begin taking lower grades in volume.

The trade is apparently convinced that developments in Singapore will dominate the action of the market locally. There is still some uneasiness in Singapore over the possibility of tappers' strikes on estates. Other than this, there seems to be little in existing conditions to encourage buyer enthusiasm.

Analysts at Merrill Lynch, Pierce Fenner & Smith point out that the best influence in favor of natural rubber seems to be its price discount to synthetic overseas. Arriving in Europe from the Far East, natural rubber sells for about 5 cents less than comparable synthetic imports. This factor, in combination with increased European automobile output, has shored up the consumption rate.

It must be said, however, that synthetic consumption is moving ahead in Europe in an ever-increasing tide. In May, another synthetic rubber plant was opened in the United Kingdom and its 1958 production is scheduled at 50,000 tons.

Iron Curtain Purchases

The June, 1958, issue of *Natural Rubber News* points out that buying by Iron Curtain countries since early 1957 has been accounting for about 15 per cent of total world production of natural rubber. This group, including Red China, is noted for the irregularity of its purchases. The 15 per cent has proven itself a major factor in bull and bear markets in rubber, particularly in recent years where the margin between world supply and demand has been very thin.

MLPFS analysts state that these purchases by the Soviet bloc this year during the January to April period were the major break in the bear market. A new pattern may emerge in the next few weeks as automobile manufacturers begin to introduce their 1959 models.

NEW YORK, JULY 1, 1958

Price Data

Closing Rubber Prices on New York Commodity Exchange

FROM JUNE 1 TO JUNE 30

June	Spot	July	Sept.	Nov.	Jan.	Sales
1	....	....	....	....	....	....
2	25.88	26.00	25.90	25.80	25.75	16
3	25.88	25.90	25.80	25.71	25.60	28
4	25.75	25.67	25.66	25.60	25.50	32
5	26.00	25.86	25.86	25.78	25.70	43
6	25.75	25.77	25.75	25.75	25.70	4
7	....	....	....	....	....	....
8	....	....	....	....	....	....
9	25.63	25.60	25.60	25.55	25.50	14
10	25.88	25.81	25.81	25.80	25.74	14
11	26.00	25.90	25.90	25.80	25.75	14
12	26.25	26.20	26.12	26.10	26.05	20
13	26.25	26.14	26.10	26.05	26.00	5
14	....	....	....	....	....	....
15	....	....	....	....	....	....
16	26.13	26.15	26.05	26.00	26.00	22
17	26.25	26.25	26.11	26.10	26.05	38
18	26.13	26.10	26.00	25.95	25.90	30
19	26.13	26.05	26.05	26.00	25.90	4
20	26.25	26.15	26.06	26.05	26.05	36
21	....	....	....	....	....	....
22	....	....	....	....	....	....
23	26.38	26.32	26.33	26.30	26.20	40
24	26.50	26.35	26.35	26.29	26.24	58
25	26.88	26.78	26.78	26.75	26.70	69
26	26.88	26.75	26.80	26.75	26.75	58
27	26.75	26.50	26.70	26.65	26.70	45
28	....	....	....	....	....	....
29	....	....	....	....	....	....
30	26.75	26.55	26.81	26.80	26.75	22

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.26⅝
Aug.	.26⅝
Sept.	.26⅝
Thin Latex Crepe:	
Spot	.25⅝
Thin Brown Crepe, No. 2	.21⅛
Flat Bark Crepe	.18½

London Market
(Standard Smoked Sheets)

Sept.	26.43 - 26.72
Oct.-Dec.	26.43 - 26.72

Singapore Market
(Standard Smoked Sheets)

Aug.	25.11 - 25.19

Middling Upland Quotations

	June 2	July 1		
	Close	High	Low	Close
July	36.23	36.35	36.25	36.25
Oct.	36.56	36.63	36.50	36.52
Dec.	36.69	36.88	36.72	36.73

Notes & Quotes

At the 59th general meeting of the Dunlop Rubber Co., Ltd., held recently in London, G. E. Beharrell, chairman, stated that in order to insure modern raw materials it is necessary to keep abreast of synthetic rubber research and development. New materials, he said, "must be expected from time-to-time to encroach upon markets where our products are already established. Synthetic foams are a case in point." Dunlop, said Mr. Beharrell, is now well-placed to benefit from activity in the plastics foam field. The chairman noted that two developments which have resulted from research during the last year are a new oil-resisting synthetic rubber and a new chemical-resisting hose for the chemical industry.

Synthetic Rubber

In a recent article published in the *New York Journal of Commerce*, O. V. Tracy, president of the Enjay Co., pointed out that synthetic rubber now commands 63 per cent of the United States market. If plans by some of the aggressive companies in the field are realized, he said, synthetic rubber will make further inroads in the remaining 37 per cent of the market now held by natural rubber. Moreover, these efforts will be accelerated if any unfavorable developments in the Far East indicate that the output of natural rubber might be reduced.

Mr. Tracy noted that in the short period of three years since the sale to private industry of the 24 government plants for producing synthetic rubber and its raw materials was approved, the government recovered 96.6 per cent of its outstanding investment in the rubber facilities.

In addition, synthetic rubber capacity has been expanded over 40 per cent. Synthetic rubber prices, however, have continued at the same level which prevailed in 1955 despite increased cost of labor and the price of new materials. To this is added the introduction of the new products such as "natural-synthetic" rubber so that this nation now has the ability to supply its entire rubber requirements from within its own boundaries in peace or war.

Steady Price Factor

Mr. Tracy went on to say that one pertinent consideration responsible for the success of the synthetic rubber industry is its steady price behavior in contrast to the wide price swings of natural rubber. Such stability on the part of basic materials is remarkable during a time when rising costs were, and still are, causing nearly everything else to advance in price.

This situation, Mr. Tracy declared, attests to the influence of healthy competition among privately owned companies. "In view of the way this transition of facilities from government to private hands has turned out, it is amusing to recall the apprehensions and dire predictions made in Congress, and to some extent in private industry, during the many months that legislation for disposal was in the making."

The Enjay president stated that since the private companies have taken over the plants, the over-all gain in capacity has been in the order of 444,000 long tons. While there are some who say that this is too great for current needs, the projected demand for 1965 is such that domestic demand will have overtaken installed capacity.

Mr. Tracy observed that the situation in the rest of the world is very promising where synthetic rubber is concerned. Countries in Europe, Asia and Latin America are becoming more and more conscious of synthetic rubber and its merits. By 1962 or 1963, he estimates, the world will have the capacity to produce 2,087,000 long tons of synthetic rubber (excluding oil), including a foreign synthetic rubber capacity of some 500,000 long tons.

MARKETS

(continued)

Reclaimed Rubber

The "dog days" of the summer are upon us and a general lethargy marks the reclaimed rubber market. The Rubber Manufacturers Association advises that in the first five months of the current year a total of 97,997 long tons of reclaim were produced in the United States, more than 20,000 long tons less than were produced in the comparable period of the preceding year.

As for consumption, in the first five months of this year, 98,862 long tons of reclaim were used against the 118,198 long tons consumed in the first five months of 1957. At the end of May, 1958, there were 27,140 long tons of reclaim in stocks on hand, while at the end of May, 1957, there were 29,847 long tons on hand.

At the current rate of production-consumption, reclaimed rubber will show a decline of about 40,000 tons in each category from the figures established in the previous year.

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.11½
First Line Whole Tire	.11
Second Line Whole Tire	.10½
Third Line Whole Tire	.10¼
Fourth Line Whole Tire	.09¾
Black Carcass	.15¼
No. 1 Light Colored Carcass	.22
No. 1 Peel	.11
Butyl Tube Reclaim	.14
Natural Rubber Black Tube	.16
Natural Rubber Red Tube	.21
Natural Rubber Gray Tube	.21

Scrap Rubber

Quiet conditions prevail in the scrap rubber market. Several reclaimers are scheduled to shut down shortly for annual vacation periods and the outlook for any improvement in the immediate future seems remote. One major reclaimer has been limiting his scrap purchases of late, preferring to work off his inventory, and has excluded mixed auto tires from any scrap he has accepted.

The Rubber Manufacturers Association reports that in the first five months of the current year a total of 88,440 long tons of scrap rubber were consumed in the United States. As of May 31, 1958, there were 55,252 long tons of scrap rubber on hand, almost a three-months supply.

From the figures available to date it would appear that something in the order of 210,000 long tons of scrap rubber will be consumed in the United States in 1958. The coming months and particularly what happens in the automobile industry will tell the story.

(Prices Delivered Akron)

Mixed tires	ton	14.00
Light colored carcass	lb.	.04¼
No. 1 peelings	ton	28.00
No. 2 peelings	ton	25.00
No. 3 peelings	ton	18.00
Buffings	ton	16.00
Truck and Bus S.A.G.	ton	19.00
Passenger S.A.G.	ton	17.00
Natural Rubber Red Tubes	lb.	.07½
Natural Rubber Black Tubes	lb.	.06¾
Butyl Rubber Tubes	lb.	.04

Tire Fabrics

According to current reports, the use of steel wire in tires will increase during the next few years particularly since steel wire tires are giving large increases in mileage. The cost factor, of course, may be an impediment to its general adoption. In the words of one tire development official, however, "the cost factor will never hold back the advance of this tire—it has too many plusses."

Wire casings are not new. Manufacturers have been utilizing steel wire for many years but the tires have never made much headway in this country because of substantially higher costs resulting from the use of four plies of steel cord.

A newer type, developed by Michelin, uses only one ply of wire encased in rubber protected by three plies of wire under the tread. Goodyear and Firestone have taken out licenses under the Michelin patents and are said to be developing their own versions. So far the American companies are believed to be working on truck tires. Steel wire passenger car tires are believed to be four or five years away.

Industrial Cloth Market

The trade reports a modest volume of buying of some wide industrial fabrics has taken place within the past few weeks. While the over-all yardage has not been heavy enough to clean out the excess stocks of wide fabrics which have long overhung the market, it has created a more optimistic tone.

It is pointed out that this is the second flurry in wide coating fabrics which has taken place within the last several weeks. Sizeable lots were sold to coaters and the automotive industry during May. The current pick-up is attributed in part to activity in the automobile industry where stocks are said to be on the light side.

Wide Fabric Situation

Prices of wide fabrics which find use in automobile interiors, furniture upholstery and other uses, are still subject to some "shading", with most goods still available from second hand sources as well as mills. The recent buying, however, has resulted in some mills holding firm at list quotations. It may be that the upturn noted in the market during the past few weeks will be sustained by the upsurge in automotive activity in the autumn. With low inventories, auto manufacturers will have to replenish stocks.

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.73
1650	lb.	.67
2200	lb.	.67½

Nylon Tire Cord

210	lb.	1.95
840	lb.	1.70

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9 oz. (per square yard)	lb.	.68
9.25 oz. (per square yard)	lb.	.66
11.65 oz. (per square yard)	lb.	.62
14.4 oz. (per square yard)	lb.	.71

Liquid Latex

Natural: The Rubber Manufacturers Association indicates that in the first five months of this year a total of 27,989 long tons of natural rubber latex were imported into the United States against the 31,264 imported in the first five months of the preceding year.

A total of 26,908 long tons of natural rubber latex were consumed in the first five months of this year, compared with the 32,132 long tons consumed in the first five months of last year. As of May 31, 1958, there were 18,180 long tons of natural rubber latex on hand, while at the end of May, 1957, there were 11,733 long tons of natural latex on hand.

Natural rubber latex is selling at about a 32 to 33c level in car load lots at East Coast ports. This is much the same level which has been in evidence during the past few months.

The figures on hand indicate that slightly more than 6,000 tons of natural latex are being consumed in the United States each month. At this consumption rate, about 72,000 long tons will be consumed this year. Consumption of natural latex last year was about 75,000 long tons. It would then seem that 1958 will be almost as good a year as 1957.

Synthetic: The synthetic latices are affected by the same market conditions which work upon the natural latices. Consumption of S-type latices, for example, is running at about 5,000 tons a month or at a 60,000 ton a year level. Last year, something over 68,000 long tons of S-type latex were consumed. Neoprene latices are being consumed at a 7,200 long ton per year level, while last year consumption ran more than 2,000 tons higher. N-type latices, on the other hand, are being consumed at a level comparable with the previous year, that is about 10,000 long tons.

Cotton

The price of middling uplands on the New York Cotton Exchange has moved in the exceedingly small range of 25 points since our last report (June 2), high for the period being 36.50c reached on June 27 and 30, and low being 36.25c reached on June 16 and 17. The average price of middling uplands cotton for the month of June was 36.33 based on 21 trading days. This compares with the May average of 36.27c.

The trade believes that before Congress adjourns a law will be passed to permit lower cotton loans next year and an increase in cotton acreage. The cotton crop is reported to be doing very well outside of some local storm damage. USDA was to have issued its first cotton acreage report on July 8. This report will indicate the acreage in cultivation as well as the acreage removed from production in the soil bank acreage reserve.

The Commodity Credit Corp. reports that as of June 7, the loans on 1957 crop cotton totaled 3,658,472 bales; repossessions totaled 767,876 bales, and the net stock stood at 2,890,596 bales.

It is reported that the world carryover on cotton as of August 1 will be the smallest in several years. Consumption exceeded production during 1957-58 by a wider margin than in the 1956-57 season.

PRICES OF COMMERCIALLY AVAILABLE SYNTHETIC RUBBER

Dry Rubber

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene NAA	.5400 [1]
Butaprene NF	.4900 [1]
Butaprene NL	.5000 [1]
Butaprene NXM	.5800 [1]
Chemigum N1	.6400 [3]
Chemigum N1NS	.6400 [3]
Chemigum N3	.5800 [3]
Chemigum N3NS	.5800 [3]
Chemigum N5	.5800 [3]
Chemigum N6	.5000 [3]
Chemigum N6B	.5000 [3]
Chemigum N7	.5000 [3]
Chemigum N8	.5000 [3]
Herecol N-33	.6800 [2]
Hycar 1001	.5800 [3]
Hycar 1002	.5000 [3]
Hycar 1014	.6000 [3]
Hycar 1041	.5800 [3]
Hycar 1042 and 1043	.5000 [3]
Hycar 1312	.5000 [3]
Hycar 1411	.6200 [3]
Hycar 1432	.5900 [3]
Hycar 1441	.6200 [3]
Paracril AJ	.4850 [2]
Paracril B	.5000 [2]
Paracril BJ	.5000 [2]
Paracril BLT	.5000 [2]
Paracril C	.5800 [2]
Paracril CV	.5900 [2]
Paracril D	.6500 [2]
Paracril 18-80	.6000 [2]
Polysar Krynac 800	.5000 [3]
Polysar Krynac 801	.5800 [3]
Polysar Krynac 802	.5000 [3]
Polysar Krynac 803	.5000 [3]

Butadiene-Styrene Types

Ameripol 1000	.2410 [3]
Ameripol 1001	.2410 [3]
Ameripol 1002	.2435 [3]
Ameripol 1006	.2410 [3]
Ameripol 1007	.2425 [3]
Ameripol 1009	.2475 [3]
Ameripol 1500	.2410 [3]
Ameripol 1501	.2410 [3]
Ameripol 1502	.2410 [3]
Ameripol 1703	.2060 [3]
Ameripol 1705	.2035 [3]
Ameripol 1707	.1910 [3]
Ameripol 1708	.1910 [3]
Ameripol 1710	.1885 [3]
Ameripol 1712	.1885 [3]
ASRC 1000	.2410 [3]
ASRC 1001	.2410 [3]
ASRC 1004	.2410 [3]
ASRC 1006	.2410 [3]
ASRC 1009	.2475 [3]
ASRC 1018	.2700 [3]
ASRC 1019	.2650 [3]
ASRC 1500	.2410 [3]
ASRC 1502	.2410 [3]
ASRC 1503	.2625 [3]
ASRC 1703	.2060 [3]
ASRC 1708	.1910 [3]
ASCR 3110	.2600 [3]
Baytown 1600	.1760 [2]
Baytown 1601	.1760 [2]
Baytown 1602	.1760 [2]
Baytown 1801	.1600 [2]
Carbomix 3750	.1820 [3]
Carbomix 3751	.1545 [3]
Copo 1500	.2410 [3]
Copo 1502	.2410 [3]
Copo 1505	.2610 [3]
Copo 1712	.1885 [3]
Copo 1773	.2060 [3]
Copo 1778	.1910 [3]
Copo 3900	.2310 [3]
FR-S 1000	.2410 [3]
FR-S 1001	.2410 [3]
FR-S 1004	.2410 [3]
FR-S 1006	.2410 [3]
FR-S 1009	.2475 [3]
FR-S 1010	.2600 [3]
FR-S 1012	.2425 [3]
FR-S 1013	.2500 [3]
FR-S 1014	.2810 [3]
FR-S 1015	.2910 [3]
FR-S 1500	.2410 [3]
FR-S 1502	.2410 [3]
FR-S 1703	.2060 [3]
FR-S 1705	.2035 [3]
FR-S 1712	.1885 [3]
Naugapol 1016	.2650 [3]
Naugapol 1018	.2700 [3]
Naugapol 1019	.2650 [3]
Naugapol 1021	.3000 [3]
Naugapol 1022	.2800 [3]
Naugapol 1023	.2850 [3]
Naugapol 1503	.2625 [3]
Naugapol 1504	.2950 [3]
Philprene 1000	.2410 [1]
Philprene 1001	.2410 [1]
Philprene 1006	.2410 [1]
Philprene 1009	.2475 [1]
Philprene 1010	.2600 [1]
Philprene 1018	.2700 [1]
Philprene 1019	.2650 [1]
Philprene 1100	.1940 [1]
Philprene 1104	.1900 [1]
Philprene 1500	.2410 [1]
Philprene 1502	.2410 [1]
Philprene 1503	.2625 [1]
Philprene 1600	.1930 [1]
Philprene 1601	.1930 [1]
Philprene 1605	.1900 [1]
Philprene 1703	.2060 [1]
Philprene 1706	.2030 [1]
Philprene 1708	.1910 [1]
Philprene 1712	.1885 [1]
Philprene 1803	.1740 [1]
Plioflex 1006	.2410 [3]
Plioflex 1500	.2410 [3]
Plioflex 1502	.2410 [3]
Plioflex 1703	.2060 [3]
Plioflex 1710	.1885 [3]
Plioflex 1712	.1885 [3]
Plioflex 1773	.2060 [3]
Plioflex 1778	.1910 [3]
Polysar Kryflex 200	.2510 [3]
Polysar Krylene	.2410 [3]
Polysar Krylene NS	.2410 [3]
Polysar Krynol 651	.1885 [3]
Polysar Krynol 652	.1910 [3]
Polysar S	.2410 [3]
Polysar S-50	.2410 [3]
Polysar S-X 371	.2550 [3]
Polysar SS-250	.2875 [3]
S-1000	.2300 [2]
S-1002	.2325 [2]
S-1006	.2300 [2]
S-1009	.2400 [2]
S-1011	.2325 [2]
S-1013	.2300 [2]
S-1100	.1850 [2]
S-1500	.2300 [2]
S-1502	.2300 [2]
S-1506	.2500 [2]
S-1600	.1825 [2]
S-1602	.1825 [2]
S-1703	.1950 [2]
S-1706	.1925 [2]
S-1707	.1800 [2]
S-1709	.1775 [2]
S-1712	.1775 [2]
S-1803	.1650 [2]
S-1804	.1750 [2]
Synpol 1000	.2410 [1]
Synpol 1001	.2410 [1]
Synpol 1002	.2435 [1]
Synpol 1006	.2410 [1]
Synpol 1007	.2410 [1]
Synpol 1009	.2475 [1]
Synpol 1012	.2425 [1]
Synpol 1013	.2500 [1]
Synpol 1061	.2410 [1]
Synpol 1500	.2410 [1]
Synpol 1502	.2410 [1]
Synpol 1551	.2410 [1]
Synpol 1703	.2060 [1]
Synpol 1707	.1910 [1]
Synpol 1708	.1910 [1]
Synpol 1711	.1900 [1]
Synpol 1712	.1885 [1]

Butyl Rubbers

Enjay Butyl 035 and 150	.2300 [2]
Enjay Butyl 165 NS	.2400 [2]
Enjay Butyl 215	.2300 [2]
Enjay Butyl 217	.2300 [2]
Enjay Butyl 218	.2300 [2]
Enjay Butyl 268 NS	.2400 [2]
Enjay Butyl 325	.2300 [2]
Enjay Butyl 365 NS	.2400 [2]
Polysar Butyl 100	.2450 [2]
Polysar Butyl 101	.2175 [2]
Polysar Butyl 200 and 300	.2450 [2]
Polysar Butyl 301	.2550 [2]
Polysar Butyl 400	.2450 [2]

Chlorosulfonated Polyethylene

Hypalon 20	.7000 [2]
Hypalon 30	.7000 [2]

Neoprene

	(prices l.c.l.)
Neoprene Types AC and CG	.5500 [2]
Neoprene Type GN	.4100 [2]
Neoprene Type GN-A	.4100 [2]
Neoprene Type GRT	.4200 [2]
Neoprene Type KNR	.7500 [2]
Neoprene Type S	.4200 [2]
Neoprene Type W	.3900 [2]
Neoprene Type WHV	.3900 [2]
Neoprene Type WRT	.4500 [2]
Neoprene Type WX	.4100 [2]

Polysulfide Rubbers

	(prices l.c.l.)
Thiokol Type A	.5000 [2]
Thiokol Type FA	.6900 [2]
Thiokol Type ST	1.2500 [2]

Silicone Rubbers*

	(prices l.c.l.)
GE (compounded)	2.50 [3]
GE Silicone Gum (not compounded)	4.00 [3]
Silastic (compounded)	1.90 [3]
Silastic (gums)	3.85 [3]
Union Carbide (gums)	4.00 [3]
Union Carbide (compounds)	2.50 [3]

Latex

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene N-300	.4600 [1]
Butaprene N-400	.5400 [1]
Butaprene N-401	.5400 [1]
Chemigum 200	.4900 [3]
Chemigum 235	.5400 [3]
Chemigum 236	.5400 [3]
Chemigum 245	.4600 [3]
Chemigum 246	.4600 [3]
Chemigum 247	.4600 [3]
Chemigum 248	.4600 [3]
Hycar 1512	.4600 [3]
Hycar 1551	.5400 [3]
Hycar 1552	.4600 [3]
Hycar 1561	.5400 [3]
Hycar 1562	.4600 [3]
Hycar 1571	.5400 [3]
Hycar 1572	.5100 [3]
Hycar 1577	.4600 [3]
Hycar 1852	.4600 [3]
Nitrex 2612	.4600 [1]
Nitrex 2614	.4600 [1]
Nitrex 2614-A	.4600 [1]
Nitrex 2515	.5100 [1]
Nitrex 2615-A	.5100 [1]
Nitrex 2616	.5400 [1]
Nitrex 2617	.4600 [1]
Nitrex 2617-A	.4600 [1]
Nitrex 2619	.5300 [1]
Nitrex 2620	.4600 [1]
Nitrex 2625	.4600 [1]

Butadiene-Styrene Types

Copo 2101	.3000 [3]
Copo 2102	.3200 [3]
Copo 2105	.3200 [3]
Copo 2108	.3375 [3]
Copo 2110	.3200 [3]
Copo X-800	.2775 [3]
FR-S 2000	.2775 [3]
FR-S 2001	.2775 [3]
FR-S 2002	.3000 [3]
FR-S 2003	.3050 [3]

POLYMERS

FR-S 2004	.3050 [2]
FR-S 2006	.2900 [2]
FR-S 2105	.3200 [2]
Naugatex 2000	.2775 [1]
Naugatex 2001	.2775 [1]
Naugatex 2002	.3000 [1]
Naugatex 2006	.2900 [1]
Naugatex 2105	.3200 [1]
Naugatex 2107	.3200 [1]
Naugatex 2108	.3000 [1]
Pliolite 2000	.2775 [3]
Pliolite 2001	.2775 [3]
Pliolite 2076	.2900 [3]
Pliolite 2104	.3200 [3]
Pliolite 2105	.3200 [3]
Pliolite 2107	.3200 [3]
Pliolite 2108	.3000 [3]
S-2000	.2275 [2]
S-2006	.2150 [2]
S-2101	.2250 [2]
S-2105	.3100 [2]
S-2107	.3200 [2]

Neoprene

Neoprene Latex 60	.4000 [2]
Neoprene Latex 571	.3700 [2]
Neoprene Latex 572	.3900 [2]
Neoprene Latex 601-A	.4000 [2]
Neoprene Latex 735	.3800 [2]
Neoprene Latex 736	.3800 [2]
Neoprene Latex 842-A	.3700 [2]
Neoprene Latex 950	.4700 [2]

Polysulfide Rubbers

Thiokol Type MX	.8000 [2]
Thiokol Type WD-2	1.2500 [2]
Thiokol Type WD-6	.8000 [2]

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

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STATISTICS of the industry

PERTINENT INDUSTRY DATA

Natural Rubber in the United States

(Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1931	501,788	355,200	25,609	322,000
1932	414,668	336,700	20,937	379,000
1933	418,902	412,400	20,576	365,000
1934	463,018	462,500	23,856	355,000
1935	467,146	495,500	11,391	303,000
1936	488,145	575,000	12,582	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	688,354	562,661	4,101	129,038
1948	735,227	627,332	6,673	141,541
1949	660,792	574,522	6,253	106,619
1950	802,249	720,268	8,644	89,215
1951	733,048	454,015	2,603	76,569
1952	805,997	453,846	3,024	95,260
1953	647,150	553,473	8,376	112,316
1954	596,848	596,285	7,443	104,543
1955	635,174	634,800	10,611	110,105
1956	580,510	563,095	11,300	115,949
1957	499,121	539,761	10,146	100,901
1957:				
Apr.	59,896	45,368	530	102,796
May	52,566	46,385	738	98,817
June	30,290	41,282	859	90,694
July	44,760	39,789	483	98,871
Aug.	48,951	44,932	1,000	99,093
Sept.	44,188	43,675	780	103,233
Oct.	49,371	48,782	926	102,496
Nov.	44,583	43,696	1,225	97,754
Dec.	44,544	38,058	1,000	100,473
1958:				
Jan.	45,564	42,597	706	104,979
Feb.	52,546	36,711	903	110,880
Mar.	41,986	38,191	1,150	112,863
Apr.	31,511	36,062	700	109,324

Source: U. S. Department of Commerce.

U. S. Imports of Natural Rubber

Year	Dry: Long Tons	Dry: Declared Value	Latex: Long Tons	Latex: Declared Value	Total Imports
1936	467,064	152,072,496	19,852	6,659,899	486,916
1937	574,600	237,307,041	23,185	10,213,670	597,785
1938	397,640	125,373,864	11,944	4,168,127	409,584
1939	469,946	167,586,780	27,437	10,467,552	497,383
1940	781,202	303,308,823	33,789	14,593,466	814,991
1941	989,498	401,976,317	34,797	15,965,627	1,024,245
1942	266,276	112,537,426	10,646	5,630,667	276,922
1943	50,358	31,369,198	1,890	1,312,202	52,248
1944	103,847	73,908,549	3,091	2,092,211	106,938
1945	134,408	95,814,102	4,773	3,115,853	139,181
1946	376,502	228,796,110	8,421	5,843,085	384,923
1947	691,087	306,951,814	17,542	9,787,722	708,629
1948	702,293	290,849,177	32,745	18,288,223	735,038
1949	630,808	225,343,624	29,743	14,968,650	660,551
1950	747,109	416,222,598	54,401	41,764,486	801,510
1951	677,874	727,343,348	54,963	80,178,309	732,837
1952	756,987	578,179,519	48,228	40,563,116	805,215
1953	571,635	284,909,223	75,511	46,353,333	647,146
1954	522,364	219,098,143	74,483	42,755,029	596,847
1955	542,507	360,435,303	92,825	80,163,114	635,332
1956	499,479	334,990,045	71,709	61,795,844	564,321
1957	475,958	291,337,628	78,567	58,249,788	554,174
1957:					
May	46,772	26,960,166	5,794	4,309,057	52,566
June	25,481	15,262,392	4,810	3,605,798	30,291
July	38,517	23,567,902	6,243	4,721,139	44,760
Aug.	42,117	25,931,151	6,834	4,900,028	48,951
Sept.	38,672	24,073,879	5,516	4,266,918	44,188
Oct.	41,020	25,996,607	8,351	6,120,335	49,020
Nov.	38,087	22,885,060	6,496	4,688,156	44,583
Dec.	46,350	26,243,338	7,572	5,141,999	53,922
1958:					
Jan.	39,275	20,938,606	6,290	4,210,554	45,565
Feb.	39,005	20,299,708	7,013	4,787,054	46,018

Source: Bureau of the Census, U. S. Department of Commerce.

World Production of Natural Rubber

(Including Latex)

(Long Tons)

Year	Malaya	Indonesia	Ceylon	Viet Nam & Cambodia	Latin America*	Rest of World*	Total*
1945	8,600*	10,000*	97,500	12,000*	47,125	73,570	250,000
1946	403,719	175,000*	94,000	19,975	39,678	105,080	837,500
1947	646,362	277,951	89,000	38,128	34,928	172,782	1,260,000
1948	698,189	432,349	95,000	43,935	29,158	225,557	1,525,000
1949	671,503	432,996	89,500	43,010	27,318	225,659	1,490,000
1950	694,090	696,472	113,500	48,482	26,902	280,299	1,860,000
1951	605,346	814,406	105,000	52,136	29,777	278,262	1,885,000
1952	584,238	750,494	96,500	63,134	35,475	261,211	1,790,000
1953	574,390	692,164	98,610	74,545	35,318	250,182	1,725,000
1954	584,435	738,670	93,935	78,024	26,833	280,112	1,802,500
1955	639,128	733,786	93,830	80,172	6,000	344,584	1,897,500
1956	568,550	686,667	95,389	89,072	22,457	336,015	1,857,000
1957	638,706	684,515	98,164	58,440	28,351	381,824	1,890,000
1957:							
Dec.	54,499	53,519	10,223	7,266	500	43,993	170,000
1958:							
Jan.	61,215	33,997	9,853	5,786	500	33,649	145,000
Feb.	51,633	28,717	6,585	....	500	30,065	117,500
Mar.	48,663	47,279	6,938	....	500	34,120	137,500

Source: International Rubber Study Group. * Estimated.

World Consumption of Natural and Synthetic Rubber

(Including Latex)

(Long Tons)

Year	United States	United Kingdom	Canada	Europe*	Rest of World*	Total*
1944	710,783	86,977	34,310	132,500	160,690	1,125,000
1945	799,009	91,047	41,836	87,500	108,164	1,127,500
1946	1,039,296	126,770	39,196	145,000	115,804	1,467,500
1947	1,122,327	156,399	61,452	242,500	153,548	1,735,000
1948	1,069,404	196,286	62,121	392,000	182,379	1,902,500
1949	988,903	186,622	56,362	446,500	207,388	1,887,500
1950	1,258,557	222,425	68,695	448,500	287,055	2,285,000
1951	1,214,298	238,101	70,809	476,500	314,941	2,312,500
1952	1,261,413	202,179	67,099	550,000	254,901	2,335,000
1953	1,338,309	211,453	73,394	521,000	343,606	2,500,000
1954	1,233,012	247,612	71,656	544,250	408,094	2,505,000
1955	1,529,699	266,804	84,528	630,000	464,250	2,980,000
1956	1,436,482	232,345	91,458	775,500	489,215	3,025,000
1957	1,464,640	239,021	88,379	777,250	565,710	3,135,000
1957:						
Dec.	105,922	23,613	6,569	56,500	45,896	237,500
1958:						
Jan.	115,222	20,483	6,202	74,750	38,343	255,000
Feb.	100,941	21,293	5,979	80,250	39,037	247,500
Mar.	104,231	23,481	5,906	.....	121,382	255,000

Source: International Rubber Study Group. * Estimated.

Rim Production

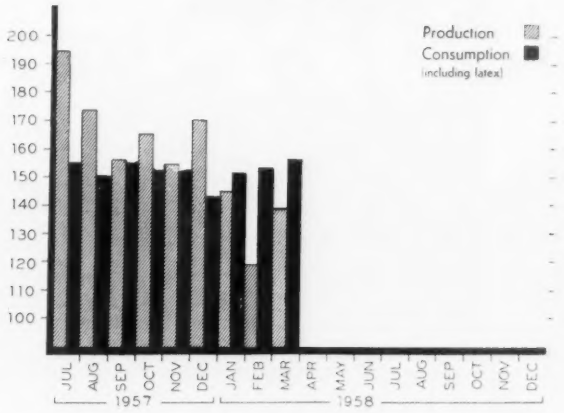
	1953	1954	1955	1956	1957
Passenger Car	31,318,461	25,952,322	38,092,080	27,109,610	27,301,567
Truck & Bus	5,228,831	4,463,689	6,642,329	6,315,428	5,468,223
Agricultural	1,943,489	1,279,040	1,931,768	1,416,938	1,368,127
Earth Mover	24,685	21,536	38,849	88,812	67,289
Total	38,514,954	31,734,587	46,705,036	34,930,788	34,205,206

	1957	1958				
	Dec.	Jan.	Feb.	Mar.	Apr.	May
Passenger Car	2,210,932	2,330,499	1,578,212	1,599,812	1,711,921	1,438,950
Truck & Bus	331,890	333,788	291,400	246,742	302,314	320,070
Agricultural	96,256	101,389	142,643	136,914	105,495	66,787
Earth Mover	2,793	3,827	4,817	3,188	4,933	2,507
	2,641,871	2,769,503	2,017,072	1,986,657	2,124,663	1,828,269

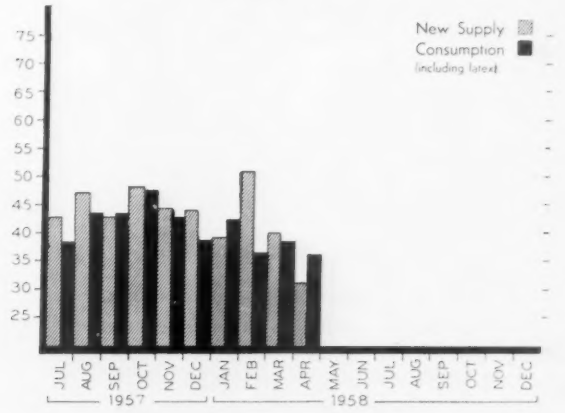
Source: The Tire & Rim Association, Inc.

STATISTICS at a glance

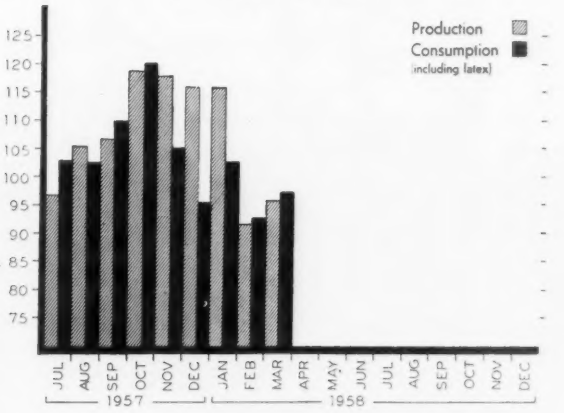
NATURAL RUBBER—WORLD
(thousands of long tons)



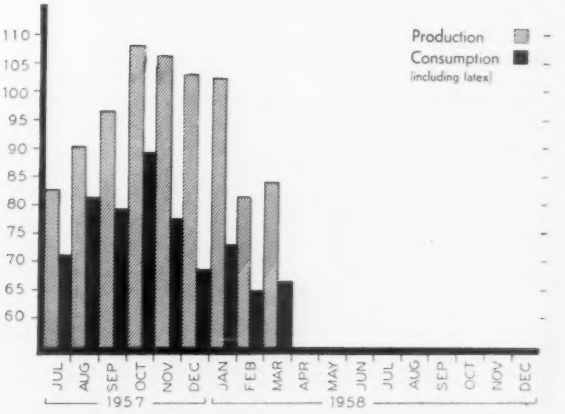
NATURAL RUBBER—UNITED STATES
(thousands of long tons)



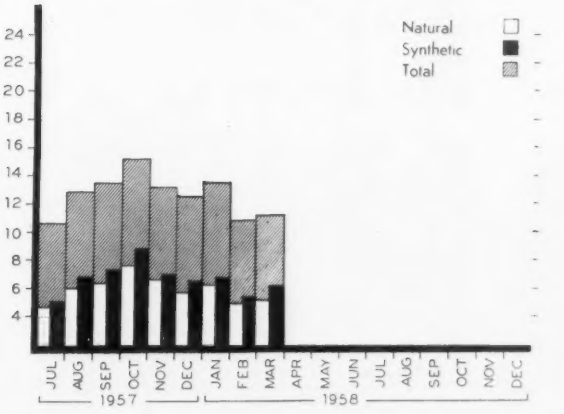
SYNTHETIC RUBBER—WORLD
(thousands of long tons)



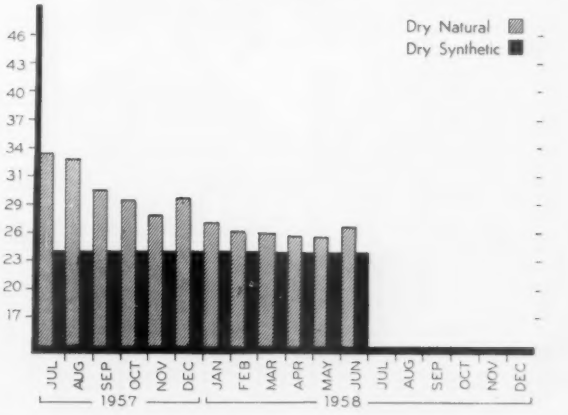
SYNTHETIC RUBBER—UNITED STATES
(thousands of long tons)



LATEX CONSUMPTION—UNITED STATES
(thousands of long tons)



PRICES—NATURAL AND SYNTHETIC
(cents per pound)



Synthetic Rubber in the United States

(All Quantities in Long Tons)

New Supply

Year	GR-S	Neoprene	Butyl	N-Type	Total
1949	**310,599**	**35,215**	**54,046**	**11,072**	**410,932**
1950	**378,887**	**50,067**	**60,915**	**12,037**	**501,906**
1951	**704,529**	**58,907**	**76,475**	**15,333**	**855,244**
1952	**654,854**	**65,745**	**81,630**	**16,228**	**818,447**
1953	**680,728**	**80,495**	**79,801**	**20,198**	**861,222**
1954	**490,405**	**69,150**	**58,802**	**21,396**	**639,753**
1955	801,145	91,357	56,179	32,623	982,304
1956	876,982	99,412	75,873	34,547	1,086,814
1957	913,321	110,721	67,418	33,618	1,125,078
1957:					
July	68,295	8,591	2,007	2,617	81,710
Aug.	76,585	9,033	5,475	2,773	93,870
Sept.	76,502	9,726	6,135	2,875	95,238
Oct.	88,400	9,545	6,085	4,002	108,289
Nov.	87,577	9,976	6,099	2,860	106,512
Dec.	85,624	9,568	6,469	2,519	104,180
1958:					
Jan.	85,828	8,804	6,189	2,419	103,240
Feb.	66,402	8,200	4,996	2,157	81,755
Mar.	69,230	7,671	4,698	2,042	83,641

Consumption

1950	**416,230**	**43,781**	**66,348**	**11,930**	**538,289**
1951	**626,444**	**48,887**	**70,500**	**13,066**	**758,897**
1952	**666,420**	**55,522**	**71,229**	**13,866**	**807,037**
1953	**624,181**	**65,900**	**77,826**	**16,929**	**784,836**
1954	**500,345**	**57,203**	**61,464**	**17,715**	**636,727**
1955	741,997	72,876	53,991	26,035	894,899
1956	727,789	74,887	49,615	24,976	877,267
1957	767,218	75,461	55,413	25,187	923,279
1957:					
Aug.	63,577	6,502	4,461	2,220	78,760
Sept.	64,005	6,351	4,654	2,141	77,151
Oct.	73,276	7,194	5,343	2,433	88,246
Nov.	62,148	6,135	4,521	2,110	74,915
Dec.	55,994	5,464	3,930	1,811	67,199
1958:					
Jan.	60,179	5,928	4,508	2,010	72,625
Feb.	52,962	5,045	4,255	1,968	64,230
Mar.	54,816	4,965	4,297	1,962	66,040

Exports

1950	**900**	**4,826**	**31**	**1,895**	**7,652**
1951	**483**	**6,825**	**216**	**1,725**	**9,249**
1952	**9,467**	**9,813**	**126**	**2,695**	**22,101**
1953	**7,692**	**11,494**	**237**	**3,245**	**22,668**
1954	**11,069**	**12,062**	**2,831**	**4,155**	**30,117**
1955	60,704	18,098	9,895	4,593	93,290
1956	112,366	21,909	8,699	6,194	149,168
1957	157,977	30,242	8,748	6,377	203,344
1957:					
June	13,886	2,315	762	492	17,455
July	14,444	3,426	1,169	631	19,670
Aug.	13,795	2,786	758	478	17,817
Sept.	11,625	1,964	540	396	14,525
Oct.	12,200	2,588	1,261	467	16,516
Nov.	12,639	2,521	809	410	16,379
Dec.	15,549	2,447	814	563	19,373
1958:					
Jan.	14,109	2,649	1,626	513	18,897
Feb.	9,947	2,626	1,415	378	14,366

Stocks

1949	**77,731**	**4,654**	**12,224**	**3,433**	**98,042**
1950	**36,942**	**5,733**	**7,243**	**2,840**	**52,758**
1951	**105,271**	**8,379**	**12,481**	**3,821**	**129,912**
1952	**83,861**	**8,535**	**22,716**	**3,875**	**118,987**
1953	**135,153**	**11,480**	**24,866**	**4,346**	**175,845**
1954	**115,499**	**11,349**	**19,267**	**4,280**	**150,395**
1955	108,989	12,220	10,500	6,030	137,739
1956	151,763	14,077	28,744	7,934	202,518
1957	140,199	18,843	31,489	7,454	197,985
1957:					
Aug.	111,962	14,603	28,339	6,784	161,688
Sept.	109,417	14,751	29,132	7,207	160,507
Oct.	113,382	15,181	29,008	7,134	164,705
Nov.	124,432	16,453	29,702	7,380	177,967
Dec.	140,199	18,843	31,489	7,454	197,985
1958:					
Jan.	152,441	18,691	31,753	7,512	210,397
Feb.	151,501	18,409	31,369	7,635	208,914
Mar.	153,221	18,504	30,796	6,947	209,468

Source: U. S. Department of Commerce.

Natural and Synthetic Rubber Latex in the United States

(All Quantities in Long Tons)

New Supply

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Grand Total
1945	4,768	15,176	7,077	.....	22,253	27,021
1946	8,012	24,810	13,595	.....	38,405	46,417
1947	17,675	22,474	6,089	.....	28,563	46,238
1948	32,630	21,494	5,022	.....	26,516	59,146
1949	29,974	21,357	3,651	.....	25,008	54,982
1950	54,401	31,339	5,725	.....	37,064	91,465
1951	54,963	32,972	6,866	2,948	42,786	97,749
1952	48,228	42,273	7,598	4,164	54,035	102,263
1953	75,511	48,112	9,026	5,844	62,982	138,493
1954	74,483	48,379	8,214	6,866	63,459	137,942
1955	92,754	69,364	10,432	10,798	90,594	183,348
1956	72,013	69,720	10,642	10,650	91,012	163,025
1957	72,252	74,535	10,403	11,420	96,358	168,610
1957:						
Apr.	8,812	6,348	976	881	8,205	17,017
May	5,794	5,495	1,082	933	7,510	13,304
June	4,809	5,241	819	886	6,946	11,755
July	6,243	4,646	572	844	6,062	12,305
Aug.	6,834	6,816	874	608	8,298	15,132
Sept.	5,516	5,649	917	1,285	7,851	13,367
Oct.	8,351	6,876	885	1,133	8,894	17,245
Nov.	6,496	6,515	1,021	994	8,530	15,026
Dec.	7,572	5,915	704	734	7,353	14,925
1958:						
Jan.	6,289	5,998	788	785	7,571	13,860
Feb.	6,485	3,852	765	671	5,288	11,773
Mar.	5,104	4,880	759	787	6,426	11,530

Consumption[1]

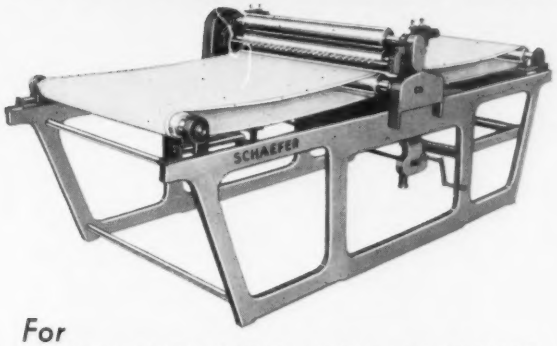
1945	3,886	14,500	6,800	....	21,300	25,186
1946	5,714	23,500	13,000	....	36,500	42,214
1947	13,909	22,500	6,500	....	29,000	42,909
1948	28,489	21,500	5,250	....	26,750	55,239
1949	36,117	21,500	3,750	....	25,250	61,367
1950	56,138	31,000	5,500	....	36,500	92,638
1951	46,750	31,031	6,279	2,628	39,938	86,688
1952	53,567	40,562	7,368	3,093	51,023	104,590
1953	67,375	46,473	7,981	3,654	58,108	125,483
1954	75,931	44,173	7,251	4,507	55,931	131,862
1955	86,478	63,982	8,736	8,495	81,213	167,691
1956	74,082	62,762	8,708	8,021	79,491	153,573
1957	75,009	68,305	9,039	8,630	85,974	160,983
1957:						
Apr.	6,308	5,636	772	710	7,118	13,426
May	5,752	5,190	814	731	6,735	12,487
June	5,338	4,861	736	610	6,207	11,545
July	5,078	4,333	677	480	5,490	10,568
Aug.	6,372	5,843	784	823	7,450	13,822
Sept.	6,515	5,761	712	753	7,226	13,741
Oct.	7,108	6,654	788	857	8,299	15,407
Nov.	6,650	5,862	725	712	7,299	13,949
Dec.	5,816	5,338	651	606	6,595	12,411
1958:						
Jan.	6,380	5,438	806	683	6,927	13,307
Feb.	5,380	4,475	640	806	5,921	11,301
Mar.	5,560	4,708	633	720	6,061	11,621

Stocks at End of Period

1945	3,121	....	....	....	....	3,121
1946	4,865	....	....	....	....	4,865
1947	5,033	....	....	....	....	5,033
1948	11,235	....	....	....	....	11,235
1949	5,063	....	....	....	....	5,063
1950	4,927	....	....	....	....	4,927
1951	4,752	3,727	1,245	532	5,504	10,256
1952	6,201	5,040	1,019	902	6,961	13,162
1953	13,532	4,794	1,117	721	6,632	20,164
1954	11,133	5,134	1,087	811	7,032	18,165
1955	13,203	6,980	1,236	1,807	10,203	23,406
1956	12,064	7,451	1,384	1,558	10,393	22,457
1957	14,454	8,347	1,267	1,974	11,588	26,042
1957:						
Apr.	12,064	8,096	1,183	1,836	11,115	23,179
May	11,733	7,885	1,407	1,710	11,002	22,735
June	10,931	8,139	1,377	2,001	11,517	22,448
July	12,073	8,045	1,296	1,953	11,294	23,367
Aug.	13,535	7,997	1,309	1,545	10,851	24,386
Sept.	12,315	7,566	1,141	1,700	10,407	22,722
Oct.	12,399	7,254	1,142	1,723	10,119	22,518
Nov.	12,316	7,558	1,265	1,927	10,750	23,066
Dec.	14,454	8,662	1,267	1,974	11,903	26,357
1958:						
Jan.	14,178	8,222	1,190	2,052	11,464	25,642
Feb.	15,506	7,992	1,251	2,297	11,540	27,046
Mar.	16,825	7,991	1,281	1,974	11,246	28,071

Source: U. S. Department of Commerce.
Note: (1) GR-S and Neoprene consumption estimated through 1950.

Schaefer Solvent RUBBER CEMENTER
for applying plastic & rubber cement



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Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1951 (total)	32,153	44,612	1,677	78,442	83,405	8,765
Passenger Car.	26,729	34,226	723	61,678	65,546	6,973
Truck and Bus	5,424	10,386	954	16,764	17,859	1,791
1952 (total)	29,484	54,342	1,520	85,346	90,411	14,110
Passenger Car.	24,106	45,458	741	70,305	74,341	11,251
Truck and Bus	5,378	8,884	779	15,041	16,070	2,859
1953 (total)	37,949	55,124	1,543	94,617	96,150	15,720
Passenger Car.	33,106	45,798	809	79,713	81,455	13,044
Truck and Bus	4,843	9,326	734	14,904	14,696	2,676
1954 (total)	33,333	55,155	1,753	90,241	89,141	14,762
Passenger Car.	29,741	47,044	928	77,713	76,794	12,217
Truck and Bus	3,591	8,111	826	12,528	12,347	2,545
1955 (total)	47,374	59,246	1,879	108,499	112,178	18,778
Passenger Car.	42,574	50,189	966	93,730	97,223	15,963
Truck and Bus	4,800	9,057	912	14,769	14,955	2,815
1956 (total)	35,422	62,146	1,757	99,325	100,406	79,872
Passenger Car.	30,873	53,252	875	85,000	85,546	16,494
Truck and Bus	4,548	8,894	883	14,325	14,859	3,378
1957 (total) ...	36,765	65,150	1,733	103,649	106,940	250,536
Passenger Car.	32,725	56,603	889	90,217	93,542	210,146
Truck and Bus	4,053	8,546	846	13,432	13,398	40,384
1957:						
Apr. (total)	3,246	5,989	146	9,381	8,950	21,308
Passenger Car.	2,809	5,218	78	8,104	7,878	17,821
Truck and Bus	438	770	69	1,277	1,072	3,486
May (total) ...	3,230	5,786	134	9,151	9,490	21,630
Passenger Car.	2,831	5,166	60	8,057	8,312	18,050
Truck and Bus	399	620	74	1,094	1,178	3,580
June (total) ...	2,993	6,191	127	9,310	8,489	20,783
Passenger Car.	2,623	5,476	63	8,162	7,462	17,322
Truck and Bus	370	715	64	1,148	1,027	3,461
July (total) ...	3,068	6,646	126	9,840	8,443	19,316
Passenger Car.	2,719	5,826	65	8,611	7,449	16,097
Truck and Bus	349	819	61	1,229	994	3,219
Aug. (total)	3,214	6,488	130	9,833	8,917	18,477
Passenger Car.	2,886	5,675	66	8,627	7,801	15,348
Truck and Bus	328	813	65	1,206	1,117	3,129
Sept. (total)	1,688	5,902	133	7,723	8,641	19,393
Passenger Car.	1,398	5,096	70	6,564	7,535	16,310
Truck and Bus	290	805	63	1,159	1,105	3,083
Oct. (total)	2,620	5,351	182	8,154	9,708	20,985
Passenger Car.	2,298	4,392	88	6,778	8,437	17,998
Truck and Bus	322	960	94	1,375	1,271	2,987
Nov. (total)	3,398	3,630	143	7,171	8,248	22,178
Passenger Car.	3,098	3,049	74	6,220	7,098	18,960
Truck and Bus	301	581	70	951	1,150	3,211
Dec. (total)	3,070	3,342	148	6,559	7,615	23,225
Passenger Car.	2,803	2,858	78	5,739	6,597	19,818
Truck and Bus	267	484	70	820	1,018	3,408
1958:						
Jan. (total)	2,653	5,511	107	8,271	7,814	22,769
Passenger Car.	2,377	4,838	50	7,264	6,740	19,299
Truck and Bus	277	674	57	1,007	1,074	3,470
Feb. (total)	2,253	4,374	110	6,737	7,314	23,392
Passenger Car.	1,998	3,727	57	5,833	6,320	19,820
Truck and Bus	254	598	52	904	994	3,572
Mar. (total)	2,114	5,334	95	7,543	7,573	23,446
Passenger Car.	1,845	4,726	49	6,621	6,569	19,786
Truck and Bus	269	608	46	923	1,004	3,659
Apr. (total)	1,876	6,183	116	8,175	7,477	22,658
Passenger Car.	1,594	5,517	61	7,173	6,522	19,051
Truck and Bus	282	666	55	1,002	955	3,607

Source: The Rubber Manufacturers Association, Inc.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1938	2,000,985	485,852	2,486,837	1948	3,909,270	1,363,856	5,273,126
1939	2,866,796	704,308	3,571,104	1949	5,108,841	1,123,736	6,232,577
1940	3,692,328	721,637	4,413,965	1950	6,665,836	1,332,263	7,998,099
1941	3,744,500	875,381	4,619,681	1951	5,337,729	1,420,432	6,758,161
1942	220,814	133,083	353,897	1952	4,320,794	1,212,790	5,533,584
1943	0	4,501	4,501	1953	6,121,787	1,202,196	7,323,983
1944	0	124,819	124,819	1954	5,558,897	1,038,045	6,596,942
1945	83,792	313,643	397,435	1955	7,920,186	1,245,018	9,165,204
1946	2,148,699	930,760	3,079,429	1956	5,816,109	1,100,417	6,916,526
1947	3,558,178	1,220,634	4,778,812	1957	6,113,344	1,097,006	7,210,350
1957:							
Jan.	628,045	91,117	719,162	July	484,718	96,048	580,766
Feb.	570,023	91,767	661,790	Aug.	521,282	90,152	611,434
Mar.	585,734	91,703	676,437	Sept.	318,279	63,131	381,410
Apr.	541,733	105,175	646,908	Oct.	291,064	88,879	379,943
May	537,112	102,312	639,424	Nov.	583,783	94,574	678,357
June	496,329	94,321	590,650	Dec.	555,242	87,327	642,569
1958:							
Jan.	478,416	79,777	558,193	July	.....	.....	.....
Feb.	396,221	71,056	467,277	Aug.	.....	.....	.....
Mar.	359,464	73,666	433,130	Sept.	.....	.....	.....
Apr.	322,482	73,886	396,368	Oct.	.....	.....	.....
May	.....	.....	.....	Nov.	.....	.....	.....
June	.....	.....	.....	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.
Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
Year	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1946	15,327	59,357	1,424	76,108	77,251	3,820
1947	25,046	46,560	2,483	74,088	79,181	8,059
1948	26,833	40,548	1,119	68,499	70,033	9,641
1949	31,521	31,450	887	63,858	65,114	10,657
1950	41,240	42,671	811	84,723	80,179	....
1951	32,151	32,284	1,071	65,507	67,249	10,094
1952	29,451	32,985	1,014	63,449	65,073	12,036
1953	37,957	36,072	878	74,907	74,425	11,874
1954	25,071	35,576	945	61,593	48,279	9,519
1955	5,001	33,387	1,001	39,389	35,900	6,833
1956	3,100	32,358	1,040	36,498	34,405	6,109
1957	3,046	35,687	1,076	39,806	39,774	50,077
1957:						
July	258	3,364	86	3,708	2,941	6,287
Aug.	243	3,358	82	3,683	3,134	5,966
Sept.	213	3,180	90	3,483	3,365	6,174
Oct.	242	2,809	121	3,172	3,764	6,909
Nov.	237	2,403	96	2,736	3,243	7,444
Dec.	225	2,392	101	2,717	2,778	7,671
1958:						
Jan.	232	4,005	72	4,309	3,344	6,700
Feb.	209	3,014	73	3,412	3,444	6,866
Mar.	209	3,481	74	3,764	3,685	7,066
Apr.	201	2,978	64	3,243	3,624	7,609

Source: The Rubber Manufacturers Association, Inc.

Vinyl and Vinyl Copolymer Resins—Sales

(Thousands of Pounds—Resin Content)

	Polyvinyl Chloride and Copolymer Resins							All Other Vinyl Resins		
	Film	Sheeting	Molding & Extrusion	Textile & Paper Treating	Flooring	Protective Coatings	All Other Uses	Adhesives	All Other Uses	Grand Total
1953	63,691	62,385	129,215	52,353	22,152	22,823	27,790	22,411	77,478	480,299
1954	69,943	56,588	147,284	49,546	34,890	23,676	35,148	26,609	74,090	517,773
1955	83,276	51,424	183,736	64,223	56,357	27,439	53,868	31,853	105,644	657,821
1956	78,063	55,598	206,726	62,931	65,384	28,522	71,859	36,565	115,151	720,799
1957	90,543	56,344	216,517	66,392	81,357	31,519	50,637	41,665	113,396	748,370
1957:										
Mar.	8,589	5,272	20,792	5,440	6,879	2,798	4,173	3,372	10,060	67,375
Apr.	7,036	4,191	18,393	4,616	7,890	3,495	4,254	4,211	8,975	63,061
May	7,641	3,765	18,218	4,628	7,519	3,227	4,388	3,404	10,371	63,161
June	7,098	3,861	17,195	4,688	6,245	2,362	3,791	4,467	9,851	59,558
July	6,342	4,362	14,340	5,371	6,030	2,755	2,872	3,236	7,976	53,284
Aug.	7,121	4,941	17,962	6,884	7,553	2,515	4,252	3,677	9,011	63,916
Sept.	9,406	4,987	18,653	6,542	7,156	2,363	4,189	3,191	8,771	65,258
Oct.	10,747	5,102	21,712	6,802	7,506	2,256	4,466	3,771	10,887	73,249
Nov.	5,569	5,142	16,940	6,151	6,224	1,916	6,211	3,197	9,265	60,615
Dec.	4,231	4,396	14,002	3,936	6,176	2,073	5,345	2,896	8,292	51,347
1958:										
Jan.	5,870	4,119	16,361	4,035	7,562	2,885	4,071	3,213	10,780	58,896
Feb.	5,902	4,412	13,907	4,468	7,964	2,250	3,369	3,484	9,193	54,949
Mar.	6,530	4,248	15,340	3,863	9,215	2,322	3,760	3,941	9,036	58,255
Apr.	5,424	4,643	15,705	3,881	9,079	2,056	5,287	4,087	9,696	59,858

Source: Chemical Division, U. S. Tariff Commission.

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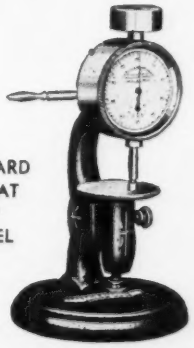

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Rubber Industry Employment Earnings and Hours

All Rubber Products

Mo.	1957 Production Workers (thousands)	1957 Average Weekly Earnings	1957 Average Weekly Hours	1957 Average Hourly Earnings	1958 Production Workers (thousands)	1958 Average Weekly Earnings	1958 Average Weekly Hours	1958 Average Hourly Earnings
Jan.	216.0	$91.21	40.9	$2.23	200.4	$87.48	38.2	$2.29
Feb.	212.6	90.80	40.9	2.22	190.9	86.56	37.8	2.29
Mar.	211.4	89.28	40.4	2.21	187.4	....	...	...
Apr.	191.3	87.60	40.0	2.19	....	....	...	...
May	204.2	88.80	40.0	2.22	....	....	...	...
June	196.8	91.21	40.9	2.23	....	....	...	...
July	199.8	94.16	41.3	2.28	....	....	...	...
Aug.	204.3	92.84	40.9	2.27	....	....	...	...
Sept.	206.4	92.97	40.6	2.29	....	....	...	...
Oct.	209.5	93.03	40.1	2.32	....	....	...	...
Nov.	209.0	93.20	40.0	2.33	....	....	...	...
Dec.	207.3	92.40	40.0	2.31	....	....	...	...
Tires and Tubes								
Jan.	87.4	107.64	41.4	2.60	81.6	98.52	36.9	2.67
Feb.	86.8	106.19	41.0	2.59	78.5	96.73	36.5	2.65
Mar.	86.9	102.40	40.0	2.56	....	....	...	...
Apr.	71.1	103.46	40.1	2.58	....	....	...	...
May	84.9	103.46	40.1	2.58	....	....	...	...
June	78.2	107.23	41.4	2.59	....	....	...	...
July	83.9	112.20	42.5	2.64	....	....	...	...
Aug.	84.2	107.83	41.0	2.63	....	....	...	...
Sept.	84.4	107.20	40.3	2.66	....	....	...	...
Oct.	84.4	105.18	39.1	2.69	....	....	...	...
Nov.	84.0	106.62	39.2	2.72	....	....	...	...
Dec.	83.6	105.84	39.2	2.70	....	....	...	...
Rubber Footwear								
Jan.	18.3	71.76	39.0	1.84	17.6	74.87	39.2	1.91
Feb.	17.8	72.10	39.4	1.83	17.2	74.49	39.0	1.91
Mar.	17.8	72.68	39.5	1.84	....	....	...	...
Apr.	17.5	70.64	38.6	1.83	....	....	...	...
May	17.3	71.92	39.3	1.83	....	....	...	...
June	17.4	72.29	39.5	1.83	....	....	...	...
July	16.8	72.13	39.2	1.84	....	....	...	...
Aug.	17.2	73.05	39.7	1.84	....	....	...	...
Sept.	17.6	74.45	39.6	1.88	....	....	...	...
Oct.	17.7	76.02	39.8	1.91	....	....	...	...
Nov.	18.0	78.96	40.7	1.94	....	....	...	...
Dec.	17.9	79.35	40.9	1.94	....	....	...	...
All Other Rubber Products								
Jan.	110.3	81.39	40.9	1.99	101.2	80.94	39.1	2.07
Feb.	108.0	81.18	41.0	1.98	95.2	79.90	38.6	2.07
Mar.	106.7	81.19	40.8	1.99	....	....	...	...
Apr.	102.7	79.60	40.2	1.98	....	....	...	...
May	102.0	79.80	40.1	1.99	....	....	...	...
June	101.2	81.81	40.7	2.01	....	....	...	...
July	99.1	82.62	40.7	2.03	....	....	...	...
Aug.	102.9	83.84	41.1	2.04	....	....	...	...
Sept.	104.4	85.08	41.1	2.07	....	....	...	...
Oct.	107.4	86.10	41.0	2.10	....	....	...	...
Nov.	107.0	85.05	40.5	2.10	....	....	...	...
Dec.	105.8	84.03	40.4	2.08	....	....	...	...

Source: U. S. Department of Labor.

Note: Data are based upon reports from cooperating establishments covering both full and part-time employees who work during, or received pay for, any part of the pay period ending nearest the 15th of the month. These employment series have been adjusted to first quarter 1954 benchmark levels indicated by data from government social insurance programs. Hours and earnings data pertain only to production and related workers.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1951	1952	1953	1954	1955	1956	1957	1958
Jan.	45.04	42.96	33.24	34.15	35.07	35.24	34.82	36.31
Feb.	(a)	41.64	33.76	35.00	35.04	36.26	34.82	35.83
Mar.	46.06	41.70	34.10	35.23	34.33	36.70	35.35	36.05
Apr.	46.60	41.79	33.85	35.22	34.23	36.81	35.43	36.00
May	46.06	39.98	34.30	35.34	34.80	36.65	35.40	36.27
June	46.06	41.31	34.11	35.17	34.83	36.67	35.45	36.33
July	46.21	40.37	34.20	35.37	34.61	35.43	35.49	....
Aug.	35.93	40.42	33.82	35.19	34.53	34.31	35.15	....
Sept.	36.20	39.75	33.69	35.46	33.85	34.35	34.74	....
Oct.	38.13	37.52	33.53	35.24	33.93	34.45	35.09	....
Nov.	42.70	35.59	33.60	34.80	34.87	34.56	36.06	....
Dec.	43.32	33.76	33.52	35.03	34.95	34.56	36.50	....
Average for Year	42.43	39.71	33.81	35.10	34.59	35.50	35.36	....

Note: The Government established a ceiling of 45.76c for spot cotton on March 3, 1951. (a) Trading suspended during February.

Production Index for the Rubber Industry

(1947-1949 = 100)

(Based on man-hours)

	1956	1957	1958		1956	1957	1958
Jan.	147	145	116	July	125	136	...
Feb.	140	141	114	Aug.	135	141	...
Mar.	135	145	116	Sept.	132	138	...
Apr.	136	132	112	Oct.	134	135	...
May	127	134	...	Nov.	126	131	...
June	120	135	...	Dec.	137	117	...

Sales by the Rubber Industry

(in Millions of Dollars*)

	1956	1957	1958		1956	1957	1958
Jan.	415	496	448	July	459	514	...
Feb.	445	495	413	Aug.	436	514	...
Mar.	451	476	396	Sept.	429	481	...
Apr.	445	490	...	Oct.	454	490	...
May	464	481	...	Nov.	463	431	...
June	450	458	...	Dec.	461	427	...

Rubber Manufacturers' Inventories

(in Millions of Dollars*)

	1956	1957	1958		1956	1957	1958
Jan.	935	1,047	1,100	July	987	1,045	...
Feb.	970	1,036	1,087	Aug.	1,007	1,074	...
Mar.	979	1,030	1,069	Sept.	1,007	1,074	...
Apr.	970	1,031	...	Oct.	1,002	1,097	...
May	985	1,024	...	Nov.	1,024	1,101	...
June	975	1,027	...	Dec.	998	1,092	...

Source: U. S. Department of Commerce.
Notes: * Adjusted for seasonal variation.

No. 1 R.S.S.—Annual Average Prices

(New York Market—Cents per Pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1916	102	55	72.50	1937	26⅞	14	**19.39**
1917	90	52	72.23	1938	17⅞	10¼	**14.64**
1918	70	40	60.15	1939	24	14⅛	**17.57**
1919	57	38½	48.70	1940	24	18¼	20.10
1920	56½	16	36.30	1941	24⅞	19⅛	**22.40**
1921	21¼	11½	16.36	1942	22½	22½	**22.50**
1922	28⅜	13⅝	17.50	1943	22½	22½	**22.50**
1923	37⅛	24¾	29.45	1944	22½	22½	22.50
1924	40⅛	17⅝	26.20	1945	22½	22½	**22.50**
1925	121	34⅜	72.46	1946	22½	22½	**22.50**
1926	88½	36¾	48.50	1947	25	14	20.00
1927	41¾	33	37.72	1948	25	18	**21.99**
1928	41¼	17	22.48	1949	19¾	15⅞	**17.57**
1929	26⅞	15½	20.55	1950	86	18	**41.10**
1930	16½	7½	11.98	1951	76	52	(a)
1931	8⅝	4¼	6.17	1952*	33	26½	29.15
1932	4¾	2½	3.49	1953	31⅞	19⅞	24.21
1933	9⅞	2⅞	5.96	1954	34½	19½	**23.61**
1934	15⅞	8¾	12.92	1955	52	29⅜	39.16
1935	13¾	10½	12.37	1956	45	26½	34.24
1936	23	13½	16.41	1957	37⅜	26⅝	31.13

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947. (a) Free trading suspended March 31, 1951. GSA selling price ranged between 52 and 66c during balance of year. * Free trading was resumed on July 1, 1952; figures represent only July through December, 1952.

No. 1 R.S.S.—Monthly Average Prices

(New York Market—Cents per pound)

	1951	1952	1953	1954	1955	1956	1957	1958
Jan.	71.21	....	29.40	20.22	33.92	41.70	33.32	27.15
Feb.	73.61	....	27.57	19.98	34.90	33.68	30.43	26.32
Mar.	72.05	....	26.59	20.16	31.08	33.68	31.76	26.64
Apr.	....	....	24.66	22.06	31.75	31.74	32.23	26.44
May	....	....	25.52	21.96	31.35	29.61	32.12	25.51
June	....	....	24.42	23.01	34.74	30.54	32.80	26.20
July	....	30.52	23.64	24.12	40.84	33.91	32.88	....
Aug.	....	29.36	23.36	23.26	45.85	35.69	32.13	....
Sept.	....	27.42	23.06	23.99	48.27	32.64	29.94	....
Oct.	....	27.26	20.82	26.57	43.81	32.68	29.24	....
Nov.	....	29.25	20.58	28.07	44.95	35.18	27.47	....
Dec.	....	31.26	20.92	29.88	48.40	37.01	29.25	....
Average for Year	(a)	29.15	24.21	23.61	39.16	34.24	31.13	....

Note: (a) Free trading suspended March 31, 1951, and resumed on July 1, 1952.

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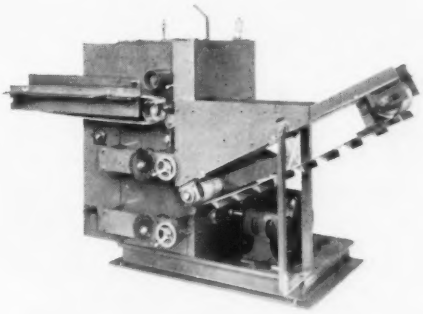

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Various Compounding Materials Consumed by the Rubber Industry

Material	1950	1951	1952	1953	1954	1955	1956
Antimony, Primary:							
Short tons	103[c]	19[c]	66[c]	20[c]	49[c]	78	56
% of total	.007	.001	.004	.001	.004	.006	.013
Asphalt:[a]							
Short tons	26,819	21,414	33,288	.....	.....	.....	.....
% of total	0.3	0.3	0.4	.....	.....	.....	.....
Barite (Barytes):							
Short tons	19,000	15,000	18,000	21,000	20,000	25,104	22,101
% of total	3.31	2.13	2.0	2.0	2.0	2.0	2.0
Carbon Black:							
Short tons	515,184	530,614	537,273	566,797	511,813	643,430	622,325
% of total	92.9	93.9	93.1	94.4	93.5	93.5	95.5
Clay, Kaolin:							
Short tons	263,306	231,331	240,982	241,052	247,431	257,223	268,157
% of total	15.0	12.7	13.2	12.8	13.2	11.9	12.0
Clay, Fire & Stoneware:							
Short tons	9,500	.....	9,322	18,475	8,781	2,928	.....
% of total	0.1	.....	0.1	.2	.1	.2	.....
Lime:							
Short tons	908	1,126	2,000	1,631	1,555	1,465	2,487
% of total	.0002	[d]	[d]	[d]	[d]	[d]	[d]
Litharge:							
Short tons	3,047	2,641	2,109	2,230	1,768	1,947	2,266
% of total	1.7	1.1	1.5	1.4	1.3	1.3	1.7
Lithopone:							
Short tons	4,092	3,295	1,523	1,723	1,701	2,163	2,000[e]
% of total	3.9	3.2	2.5	3.3	3.9	5.0	5.0
Mica, Ground:							
Short tons	5,776	6,551	5,126	5,668	5,021	7,339	7,021
% of total	8.0	9.0	7.0	7.8	6.3	6.9	8.0
Sulfur:							
Short tons	75,000	84,000	84,000	89,600	84,000	89,600	89,600
% of total	1.3	1.4	1.4	1.4	1.3	1.2	1.1
Talc:[b]							
Short tons	75,900	70,970	64,476	61,408	58,139	38,309	30,253
% of total	12.0	11.2	10.9	10.0	9.7	5.4	5.0
Zinc Oxide:							
Short tons	82,944	71,507	72,774	78,439	71,058	86,677	90,000[e]
% of total	51.6	48.4	51.2	52.7	50.7	51.5	52.0

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes prophyllite and ground soapstone. (c) Does not include precipitated antimony sulfide as in previous years. (d) Negligible. (e) Estimated.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	New Supply	Consumption: Tons	Consumption: % to Crude[a]	Exports	Stocks On Hand at End of Period
1941	274,202	251,231	32.2	13,851	41,750
1942	286,007[b]	254,820	64.6	30,405	42,532
1943	304,058[c]	291,082	59.6	15,678	46,201
1944	260,631[d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1947	291,395	288,395	24.8	14,556	35,943
1948	266,861	261,113	24.4	11,428	32,630
1949	224,029	226,679	22.5	10,637	28,263
1950	314,008	303,733	24.1	11,740	35,708
1951	366,700	346,121	26.6	14,722	45,082
1952	274,981	280,002	22.2	11,180	30,664
1953	298,336	285,050	21.3	11,597	32,319
1954	258,101	249,049	20.2	10,232	30,746
1955	326,649	312,781	20.4	13,988	31,498
1956	287,220	270,547	18.8	13,832	34,969
1957	271,647	267,352	18.2	13,021	29,323
1957:					
Apr.	22,878	23,145	19.0	1,201	30,258
May	24,884	23,816	18.8	1,277	29,847
June	22,402	21,352	19.1	1,083	30,379
July	20,469	19,676	18.1	757	29,972
Aug.	20,432	22,429	18.1	917	28,521
Sept.	19,892	21,704	17.9	714	25,983
Oct.	26,419	24,925	18.1	1,230	27,171
Nov.	22,083	20,583	17.3	1,150	27,855
Dec.	20,101	18,263	17.2	843	29,323
1958:					
Jan.	21,172	21,186	18.4	892	29,569
Feb.	18,319	18,130	18.0	665	28,838
Mar.	19,601	19,300	18.5	....	28,984

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes prophyllite and ground soapstone. (c) Does not include precipitated antimony sulfide as in previous years. (d) Negligible. (e) Estimated.

Cotton, Rayon and Nylon Tire Fabrics

(In Thousands of Pounds)

	Production: Rayon Tire Cord Not Woven	Production: Rayon Tire Cord Woven	Production: Cotton and Nylon Cord & Fabric[a]	Production: Chafer Fabrics (all fibers)	Production: Total Tire Cord and Fabric	Stocks[b]: Cotton and Nylon Cord & Fabric	Stocks[b]: Rayon Cord and Fabric
1957:							
Jan.-Mar.	21,853	68,825	31,393	11,028	123,182	11,844	37,153
Apr.-June	16,037	63,195	35,308	10,456	115,418	13,428	13,473
July-Sept.	10,509	54,968	33,477	9,147	100,091	13,305	36,388
Oct.-Dec.	9,216	58,392	32,827	10,176	101,687	14,909	29,632
Total	57,615	245,380	133,005	40,807	440,378	53,486	116,646
1958:							
Jan.-Mar.	8,372	56,522	25,647	7,367	92,924	11,255	33,913
Apr.-June	.....	.....	.....	.....	.....	.....	.....
July-Sept.	.....	.....	.....	.....	.....	.....	.....
Oct.-Dec.	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....

Source: Bureau of the Census, U. S. Department of Commerce.
Notes: (a) Combined to avoid disclosing figures for individual companies. (b) At end of period.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1952	1953	1954	1955	1956	1957	1958
Jan.	86,863	89,634	89,852	96,397	100,642	109,295	107,281
Feb.	82,043	86,458	86,206	88,464	98,088	96,694	95,516
Mar.	87,065	98,158	101,549	105,684	112,412	113,166	108,733
Apr.	98,563	102,044	103,866	111,116	113,034	115,820	.....
May	101,137	105,918	104,418	115,707	123,560	124,325	.....
June	99,305	114,703	113,037	120,710	126,838	121,598	.....
July	105,307	112,969	112,231	115,653	120,708	130,251	.....
Aug.	102,954	109,124	110,223	121,816	125,847	128,808	.....
Sept.	100,095	106,158	104,706	113,379	111,574	113,567	.....
Oct.	103,689	106,037	105,607	112,558	119,204	119,334	.....
Nov.	91,326	99,210	102,393	109,212	112,113	107,705	.....
Dec.	95,817	100,225	104,258	111,034	108,096	112,691	.....
Total	1,154,254	1,230,629	1,238,346	1,321,730	1,372,116	1,393,254	.....

Source: U. S. Bureau of Mines.

U. S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

(All Quantities in Long Tons)

Year	Balata: Tons	Balata: Value	Jelutong: Tons	Jelutong: Value	Gutta-Percha & Other Guttas: Tons	Gutta-Percha & Other Guttas: Value
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1947	1,982	2,276,531	2,878	1,496,887	392	779,591
1948	1,195	805,078	3,401	2,377,765	423	542,788
1949	1,391	814,554	1,043	834,978	197	189,021
1950	2,117	1,589,885	1,789	1,515,162	541	745,418
1951	2,452	1,973,271	1,669	2,608,359	383	430,539
1952	988	762,994	1,636	2,094,983	282	385,890
1953	1,619	866,248	1,027	1,166,837	235	303,116
1954	949	504,065	2,196	2,624,926	417	511,055
1955	1,022	967,369	1,679	1,731,821	284	318,115
1956	1,396	1,111,165	1,851	1,909,447	290	309,615
1957	1,037	670,821	1,680	1,942,067	230	270,487
1957:						
July	33	15,195	161	185,524	28	32,282
Aug.	19	10,245	126	138,622	7	5,544
Sept.	164	119,808	110	145,817	16	16,422
Oct.	97	68,547	166	207,038	5	9,259
Nov.	110	85,126	117	136,806	2	13,797
Dec.	71	55,902	136	144,229	....	.....
1958:						
Jan.	10	9,732	122	132,581	6	12,975
Feb.	4	3,390	46	45,507	7	19,454

Source: U. S. Department of Commerce.

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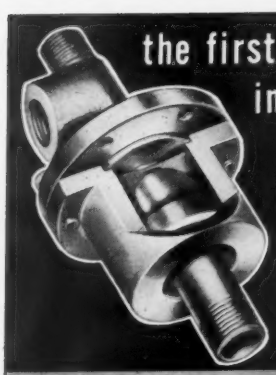

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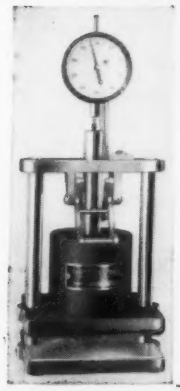

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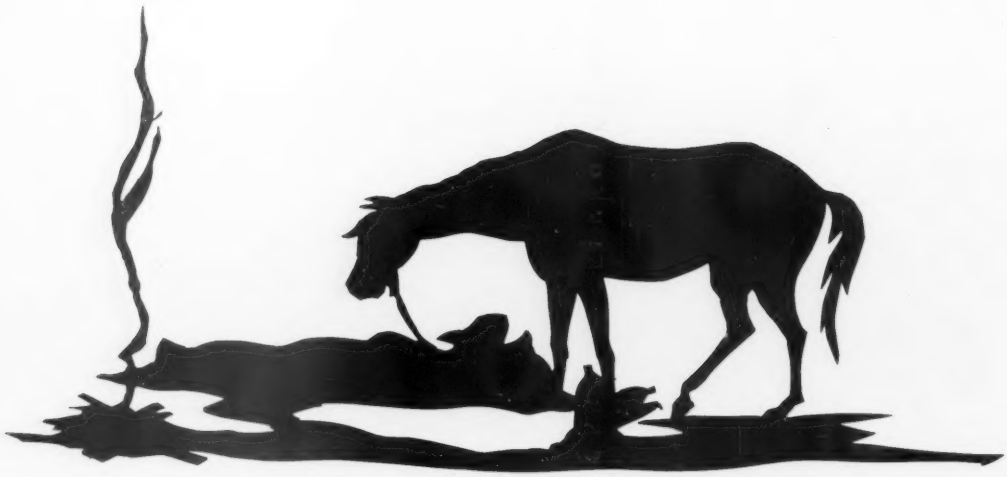

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